CITY OF MURFREESBORO

WASTEWATER FACILITIES PLAN
2002 Revision

VOLUME 1

WASTEWATER COLLECTION SYSTEM

January, 2002

MWSD

SSR

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US 41/Florence Road Assessment District Study, April 2001, MWSD

Overall Creek Basin "C" Assessment District Study, February 2000, MWSD

John Bragg Highway Assessment District Study, MWSD

Thompson Lane Assessment District Study, MWSD

1. SUMMARY AND RECOMMENDATIONS

1.1 *Statement of Problem*

Murfreesboro was recently named as the Most Livable Town in Tennessee. Therefore, it is little wonder that Murfreesboro is also one of the fastest growing cities in Tennessee.

Murfreesboro has a long and sustained record of progressive leadership. Growth has been quite healthy over the last 50 years. The City has managed to retain its character, including a number of antebellum homes and other ties with its early history.

In order to maintain its orderly and stable growth, the City has periodically authorized engineering studies and planning reports to update the long range plan for growth of municipal utilities, including the water and sewer systems. The most recent study of the sewer system was the 201 Facilities Plan Update completed in 1992. Since then, many of the improvements proposed in the Study have been completed. These include the expansion of the Sinking Creek WWTP, the Overall Creek Basin Collection System and many others.

Development in areas surrounding the City has resulted in the need to plan future expansion of the municipal sewer system. It has been the consistent policy of the Murfreesboro Water and Sewer Department to extend sewer service to all significant roadway interchanges and major drainage basins in the vicinity of the City. Several new interchanges have been constructed or are proposed off of I-24 (at Salem Road, Manson Pike, and Elam Road) and SR 840 (at Beasley Road and at Sulphur Springs Road). In addition, the City (along with other local entities) adopted a new planning area for potential city services in 2000 known as the Urban Growth Boundary (UGB). The UGB significantly expanded the potential service area for the City. This “Wastewater Facilities Plan - 2001 Revision” has been authorized to provide a roadmap for improvements over the next 20 years and beyond.

This report describes additions and improvements required in the Murfreesboro wastewater system. The objective of the report is to develop preliminary sizes, locations, and costs for upgrading and expanding the Murfreesboro wastewater system. The report updates the "Facilities Plan for Sanitary Sewerage Improvements, City of Murfreesboro, Tennessee", published in April 1974 and the 201 Facilities Plan Update of 1992.

1.2 *Summary of Alternative Solution Considered*

Alternative solutions were analyzed for each of the wastewater collection system additions proposed in this plan. Potential improvements to the Murfreesboro collection system were limited to one of six alternatives. They are as follows:

- No Action
- System Rehabilitation
- Replace Existing System
- Provide Parallel Capacity
- Provide Parallel Capacity and Rehabilitate Existing System
- Provide Sanitary Sewer Service

A Decision Matrix was developed to aid in the choice of alternates. A full discussion of the Alternates and a copy of the Decision Matrix are found under Section 6.

1.3 *Recommended Solution*

This plan recommends a number of collection system improvements required to meet the sewer service needs of the planned service area. The recommended improvements to the Murfreesboro Wastewater Collection System are categorized into three elements: They are:

- Short Range Improvements (0 - 5 years) - Exhibit 8.1
- Medium Range Improvements (5 - 15 years) - Exhibit 8.2
- Long Range Improvements (over 15 years) - Exhibit 8.3

The individual projects are discussed fully in Section 7. The following three tables summarize the recommended short, medium and long range improvements.

Table 1.1
Proposed Short Range Improvements

IMPROVEMENT	STATUS	ESTIMATED PROJECT COST
Sinking Creek Relief Sewer Phase I	Planned	$ 1,235,520
Bushman Creek Relief Sewer Phase I (DeJarnette Ln PS)	Under Design	$ 3,673,540
Miscellaneous- Abandon Pump Station #15	Under Design	$ 380,120
Southwest Relief Sewer Phase I	Planned	$15,771,600
Elam Rd/ Buchanan Rd Sewer	Under Design	$ 7,254,130
Salem/ Barfield Sewer Phase I	Under Design	$2,922,400
Puckett Creek Interceptor Phase I	Planned	$ 3,556,800
Bradyville Rd Replacement	Planned	$917,280
Miscellaneous- Cherry Lane	Planned	$1,027,000
Medical Center Parkway	Under Design	$4,092,530
TOTAL		**$40,830,920**
TOTAL NOT UNDER DESIGN (Includes Contingencies, etc.)		**$22,508,200**

Table 1.2
Proposed Medium Range Improvements

IMPROVEMENT	ESTIMATED PROJECT COST
Miscellaneous- Cherry Lane Area Sewers	$ 813,800
VA Relief System	$ 5,337,280
Sinking Creek Relief Sewer Phase II	$ 2,964,000
Sinking Creek Relief Sewer Phase III	$ 4,464,720
Northeast Relief Sewer	$ 2,826,720
Bushman Creek Relief System Phase II	$ 8,574,800
Bradyville Road Relief Sewer	$ 2,003,040
Lytle Creek Sewer Phase I	$ 7,974,720
Lytle Creek Sewer Phase II	$ 12,277,200
Overall Creek Interceptor Phase I	$ 2,731,300
Puckett Creek Interceptor Phase II	$ 2,152,800
Puckett Creek Interceptor Phase III	$ 436,800
Miscellaneous	$ 611,520
Stones River Relief Sewer	$21,216,000
Southwest Relief Sewer Phase II	$ 6,589,440
Salem/Barfield Sewer Phase II	$ 1,279,200
Salem/Barfield Sewer Phase III	$ 1,223,040
US 41/ SR 840 Sewer System	$ 7,382,440
TOTAL	**$90,858,820**

Table 1.3
Proposed Long Range Improvements

IMPROVEMENT	ESTIMATED PROJECT COST
Northern Collection System	$22,419,540
Walter Hill Collection System	$ 3,608,800
East Fork Collection System	$13,564,980
Sulphur Springs Road Collection System	$ 2,721,420
Lytle Creek Sewer Phase III	$ 2,246,400
Salem/ Barfield Sewer Phase IV	$ 4,368,000
Puckett Creek Interceptor Phase IV	$ 2,789,280
Puckett Creek Interceptor Phase V	$ 1,497,600
Overall Creek Interceptor Phase III	$ 2,184,000
Stewart Creek Collection System	$ 7,116,200
TOTAL	**$62,516,220**

2. PURPOSE AND NEED

2.1 *Study Purpose*

The City of Murfreesboro completed an update of its 201 Facilities Plan in 1992. This updated plan indicated that there were certain short-term and long-term improvements for the Murfreesboro Wastewater Collection System.

Since 1992, many of the recommended improvements have been executed by the Murfreesboro Water and Sewer Department. At the same time, the City and Rutherford County have grown significantly as evidenced by the results of the 2000 U.S. census. In addition, the City has adopted an Urban Growth Boundary which expands its potential area of influence more than five fold.

The purpose of this study is to evaluate the City's wastewater collection system needs in light of the above. This study is intended to provide guidance for the Murfreesboro Water and Sewer Department in planning, scheduling and budgeting improvements for its wastewater collection system.

2.2 *Need for this Project*

The need for construction of collection system improvements in the Murfreesboro service area draws from the increasing population served by the system and the flows generated. Table 2.1 indicates present and projected average flow rates for each of the major drainage basins in the Murfreesboro service area. In addition, the table indicates the peak flow

rates for each basin. The need for improvements is clearly indicated where the projected wet weather peak flows exceed the capacity (ies) of the City's collection system.

Table 2.1
Current and Projected Flow Rates

Interceptor	Size	Capacity	Current Pop.	Current*	Current*	2020 Pop.	2020	2020	2050 Pop.	2050	2050
	(in)	(mgd)	Served	ADF (mgd)	WWPF (mgd)	Served	ADF (mgd)	WWPF (mgd)	Served	ADF (mgd)	WWPF (mgd)
Sinking Creek	30	11.9	32,528	4.2	12.7	48,439	6.3	18.9	73,112	9.5	28.5
Bushman Creek	18	3.3	11,279	1.5	4.4	20,426	2.7	8.0	38,165	5.0	14.9
Northeast	18	3.3	5,830	0.8	2.3	8,500	1.1	3.3	10,425	1.4	4.1
VA	21	3	7,372	1.0	2.9	10,298	1.3	4.0	12,822	1.7	5.0
Stones River	42	20.6	43,035	5.6	16.8	85,523	11.1	33.4	146,031	19.0	57.0
Lower Lytle	21	3.2	6,425	0.8	2.5	7,418	1.0	2.9	8,050	1.0	3.1
Lower Lytle-2	30	6.5	13,183	1.7	5.1	22,084	2.9	8.6	44,011	5.7	17.2
Upper Lytle	30	6.5	2,261	0.3	0.9	8,945	1.2	3.5	30,771	4.0	12.0
Bradyville Rd	24	4.6	9,848	1.1	3.3	11,565	1.5	4.5	12,490	1.6	4.9
Stones River Ext	30	6.5	19,049	2.4	7.2	50,842	6.6	19.8	88,805	11.5	34.6
Southwest	21	4.6	18,331	1.7	5.0	49,912	6.5	19.5	87,660	11.4	34.2
Southwest Relief	18	2.3	11,633	1.5	4.5	35,816	4.7	14.0	69,778	9.1	27.2
Samsonite Relief	21	4	5,328	0.7	2.1	11,362	1.5	4.4	16,282	2.1	6.4
Overall Creek	36	16.5	1,063	0.1	0.4	44,223	5.7	17.2	97,191	12.6	37.9

*Current Average Daily Flow (ADF) and Wet Weather Peak Flow (WWPF) calculated based upon tributary population. See Section 4 for actual flow measurements.

3. GENERAL INFORMATION

3.1 *Existing Facilities and Area Served*

The Murfreesboro Water & Sewer Department provides water and sewer services to the approximately 70,000 residents (68,816 as of 2000 Census) of the City of Murfreesboro. Less than 3% of the area within the corporate limits of Murfreesboro is currently unserviced by sanitary sewer. The existing corporate limits encompass approximately 42 square miles and are centrally located within Rutherford County.

The existing collection system contains approximately 1,868,000 lineal feet of gravity sewer lines, 101,000 lineal feet of force mains and 33 lift stations. These facilities are classified both by a Sanitary District designation, and by a drainage basin designation that is associated with flow meters located strategically throughout the collection system. Tables 3.1 and 3.2 identify each of these flow-monitoring basins, as well as the lengths and sizes of the gravity sewers and force mains within each basin. Exhibit 3.1 illustrates the spatial arrangement of each drainage basin as well as the location of each of the permanent monitoring stations. Table 3.3 contains the Station numbers and names associated with each of the 34 lift stations in the Murfreesboro system. Wastewater treatment is provided for the City of Murfreesboro at the Sinking Creek Wastewater Treatment Plant. The facility provides tertiary treatment and is currently rated at 16 million gallons per day.

Table 3.1
Existing Gravity Sewers

INTERCEPTOR	Monitor #	Total Length	SIZE															
			Diameter Unknown	4"	6"	8"	10"	12"	15"	16"	18"	20"	21"	24"	27"	30"	36"	42"
Stones River Interceptor at WWTP	MF01	190,308	2,894	0	3,634	127,326	18,613	1,255	0	0	620	94	8,279	2,788	0	3,014	3,751	18,040
Sinking Creek Interceptor @ WWTP	MF02	154,506	794	0	88	126,181	120	0	0	0	8,993	205	5,378	588	9,974	2,142	0	43
Sinking Creek Interceptor @ 24"	MF03	123,834	1,069	0	85	95,634	9,998	2,998	503	4,250	0	0	3,133	6,164	0	0	0	0
Lower Lytle Creek Interceptor	MF04	107,063	4,992	0	638	82,854	3,953	5,677	2,651	0	3,256	0	2,253	0	0	789	0	0
Upper Lytle Creek Interceptor	MF05	150,911	12,304	0	1,473	102,131	11,387	6,574	4,300	1,311	2,503	0	4,520	317	0	4,091	0	0
Samsonite Relief Sewer	MF06	79,699	2,958	170	682	29,680	17,882	8,740	9,986	0	0	492	9,109	0	0	0	0	0
Bradyville Road Int.	MF07	168,397	1,800	0	432	133,663	12,085	10,629	1,032	47	8,709	0	0	0	0	0	0	0
VA Interceptor	MF08	209,435	1,123	0	0	169,738	7,350	13,617	8,164	0	9,443	0	0	0	0	0	0	0
DeJarnette Lane PS	MF09	217,658	3,799	0	296	170,896	10,357	9,688	16,645	272	5,705	0	0	0	0	0	0	0
Upper Sinking Creek Int	MF10	112,793	4,598	0	1,391	81,848	334	10,415	4,840	1,117	2,732	0	5,518	0	0	0	0	0
Southwest Interceptor	MF11	198,643	2,756	0	70	154,245	16,145	7,320	3,294	253	6,127	700	7,733	0	0	0	0	0
Southwest Relief Sewer	MF12	154,755	1,773	0	10	102,010	11,544	16,023	4,014	540	18,841	0	0	0	0	0	0	0
Overall Creek Interceptor	N/A	24,583	0	0	0	0	0	0	0	0	0	0	0	9,864	0	0	14,719	0
Puckett Creek Interceptor	N/A	24,356	0	0	0	0	0	0	0	0	14,038	0	10,318	0	0	0	0	0
	TOTALS	**1,916,941**	**40,860**	**170**	**8,799**	**1,376,206**	**119,768**	**92,936**	**55,429**	**7,790**	**80,967**	**1,491**	**56,241**	**19,721**	**9,974**	**10,036**	**18,470**	**18,083**

Table 3.2
Existing Force Mains

	Monitor #	Total Length	Size									
			Unknown	2"	4"	6"	8"	10"	12"	14"	16"	18"
Stones River Interceptor at WWTP	MF01	40,612	127	0	2,701	2,738	0	0	0	17628	0	17418
Sinking Creek Interceptor @ WWTP	MF02	10,699	0	817	5075	0	0	2297	0	0	2,510	0
Sinking Creek Interceptor @ 24"	MF03	0	0	0	0	0	0	0	0	0	0	0
Lower Lytle Creek Interceptor	MF04	0	0	0	0	0	0	0	0	0	0	0
Upper Lytle Creek Interceptor	MF05	5,929	0	0	0	0	5,929	0	0	0	0	0
Samsonite Relief Sewer	MF06	0	0	0	0	0	0	0	0	0	0	0
Bradyville Road Int.	MF07	637	0	0	637	0	0	0	0	0	0	0
VA Interceptor	MF08	14,127	0	0	3938	0	0	1,484	6,436	0	2,269	0
DeJarnette Lane PS	MF09	17,332	0	0	1315	3,681	1,806	5,461	0	5069	0	0
Upper Sinking Creek Int	MF10	1,733	0	0	1,286	447	0	0	0	0	0	0
Southwest Interceptor	MF11	6,129	506	0	2810	2,813	0	0	0	0	0	0
Southwest Relief Sewer	MF12	3,710	0	360	0	0	0	1,719	1,631	0	0	0
Overall Creek Interceptor	N/A	35,046	0	0	0	0	0	0	0	17,628	17,418	0
Puckett Creek Interceptor	N/A	0	0	0	0	0	0	0	0	0	0	0
	TOTALS	**135,954**	**633**	**1,177**	**17,762**	**9,679**	**7,735**	**10,961**	**8,067**	**22,697**	**4,779**	**17,418**

Table 3.3
Existing Pump Stations

STATION NUMBER	STATION ADDRESS	LATITUDE/ LONGITUDE	CAPACITY	DESIGN HEAD
2	International Paper Stones River	35:53:03/86:25:55	180 gpm	35'
10	3173 North Thompson Lane	35:54:41/86:24:45	2200 gpm	44'
17	Stones River Battlefield	35:52:55/86:26:04	50 gpm	20'
19	Broad St. - Waite	35:53:09/86:26:02	75 gpm	25'
20	2240 NW Broad St. - Neil Sandler	35:53:16/86:20:01	80 gpm	28'
28	3427 Memorial Blvd. - VA Hospital	35:54:47/86:23:03	975 gpm	53'
34	1855 Manson Pike	35:51:50/86:25:20	80 gpm	40'
35	759 N. Thompson Lane	35:51:31/86:25:46	300 gpm	60'
37	Oakleigh Cove	35:43:19/86:25:47	110 gpm	58’
13	1931 Dejarnette Lane - Oakland	35:53:07/86:20:47	1225 gpm	60'
14	589 Dejarnette Lane - Jennings	35:53:14/86:21:51	2600 gpm	52'
15	309 Dejarnette Lane - Alsup	35:53:20/86:22:30	3000 gpm	60'
22	2503 Alexander Blvd. - Bradford Pl.	35:53:29/86:22:23	180 gpm	51'
25	1084 Compton Road - "A"	35:54:21/86:21:01	800 gpm	52'
26	820 Compton Road - "B"	35:54:26/86:21:41	1000 gpm	43'
27	542 Compton Road - "C"	35:54:34/86:22:23	1400 gpm	79'
30	2831 Meadowhill Dr. - Meadowwood	35:53:56/86:21:27	180 gpm	70'
32	2633 English Hill Dr. - Huntington Pl.	35:53:34/86:21:29	150 gpm	30'
33	BFI Landfill	35:56:36/86:22:13	100 gpm	135'
36	Meaderlay Way - Hawk's Ridge	35:54:37/86:21:05	180 gpm	49’
3	1030 Golf Lane - Agri. Center	35:50:55/86:24:52	5800 gpm	SR
6A	1214 Raleigh Ct. - Scotland Acres	35:51:31/86:21:32	100 gpm	47'
6B	1214 Raleigh Ct. - Scotland Acres	35:51:31/86:21:32	350 gpm	38'
8	521 Warrior Drive	35:48:28/86:24:22	1000 gpm	65'
9	Ransom Drive - Lakeview	35:49:03/86:21:46	120 gpm	27'
18	2426 East Main St. - Holly Park	35:50:10/86:20:57	100 gpm	65'
21	507C River Rock Blvd. - Riv. Chase	35:50:25/86:25:50	125 gpm	18’
23	1555 Kensington Drive	35:48:58/86:21:56	380 gpm	66'
29	1921 Pacific Pl. - Olympic Springs	35:49:04/86:25:54	135 gpm	42'
31	1736 Mercury Blvd.	35:50:20/86:21:36	400 gpm	27'
38	4656 NW Broad - Overall Creek	35:54:55/86:27:31	2850 gpm	148’
39	31196 Holsted Drive	35:48:57/86:26:04	215 gpm	30'

3.2 *Optimum Performance Available with the Existing Facilities/ Operational Problems*

At its peak capacity, the Murfreesboro Water & Sewer Department sanitary sewage collection system can convey approximately 45 million gallons per day of flow to the Sinking Creek Wastewater Treatment Plant. This determination is based upon measured flow from the two primary gravity interceptors (the Sinking Creek Interceptor and the Stones River Interceptor) as well as the ultimate pumping capacity of the Overall Creek Pump Station. The permanent flow monitors in the collection system indicate that flows above this level cause surcharging of the sewer lines in the vicinity of the treatment plant.

The sanitary collection system is comprised of 14 primary interceptor systems which are conveyed into the Stones River Interceptor and Sinking Creek Interceptor and conveyed to the treatment facility. The sizes and capacities of each of these interceptors are summarized in Table 3.4. Additional data is contained in Appendix A. As stated previously, the flow rate to the treatment plant is currently limited by the capacities of the Stones River Interceptor and Sinking Creek Interceptor. Additional growth in the City will necessitate the removal of this bottleneck from the collection system.

Pumping capacities and pertinent information relating to the 34 lift stations operated by MWSD are summarized in Table 3.3. Several of these stations are nearing their design life and are in need of major rehabilitation or replacement. Most of the City's current sanitary system overflows (SSO's) can be attributed to either mechanical failure at one of these stations, or exceedance of the station's capacity due to excessive I/I after heavy rains.

Table 3.4
Capacities of Existing Interceptors

Interceptor	Segment	Size (in)	Slope (%)	Capacity (MGD)
Sinking Creek				
	From Junction Box at WWTP to Thompson Lane	30	0.2	11.9
	From Thompson Lane to Sulphur Springs Road	27	0.2	9.0
	From Sulphur Springs Road to Maitland	24	0.2	6.5
	From Maitland to Bell Street	21	0.15	4.0
	From Bell Street to College Road	18	0.2	3.0
	Above College Road	12	0.4	1.5
Bushman Creek				
	Sinking Creek Interceptor to U. S. 231	27	0.26	10.2
	U. S. 231 to N.E. Interceptor	27	0.24	9.8
	Above N.E. Interceptor	15	0.6	3.2
Northeast				
	Bushman Creek Interceptor to Northfield Blvd.	18	0.18	2.9
	Above Northfield Blvd.	12	0.22	1.1
VA				
	From Sinking Creek Interceptor to Thompson Lane P.S.	21	0.7	8.6
	From Thompson Lane P.S. to U.S. 231	18	0.2	3.0
	PS V7 to PS C Force Main	18	0.2	3.0
	PS C to PC B Force Main	15	0.4	2.6
	PS B to PS A Force Main	12	1.04	2.4

Table 3.4 (Cont'd)
Capacities of Existing Interceptors

Interceptor	Segment	Size (in)	Slope (%)	Capacity (MGD)
Stones River				
	Plant to Old Broad Street Plant Site	42	0.1	20.6
	Old Broad Street Plant Site to Ridgely Road	**	0.07	18.9
	** Parallel 21" and 30" sewers			
Lower Lytle		21	0.1	3.2
Lower Lytle-2				
	Ridgely Road to Main and Broad Streets	30	0.06	6.5
	Main and Broad Streets to Church Street	30	0.06	6.5
Upper Lytle				
	Church and Broad to Church and Rushwood	15	0.11	1.4
	Church and Rushwood to Sanbyrn Drive	12	0.15	0.9
	Above Sanbyrn Drive	21	0.1	3.2
Bradyville Rd				
	Church Street to Manchester Pike	24	0.1	4.6
	Manchester Pike to Bradyville Road Diversion Station	18	0.12	2.4
	Bradyville Road Diversion Station to Minerva Drive	18	0.16	2.7
Stones River Ext		30	0.2	6.5

Table 3.4 (Cont'd)
Capacities of Existing Interceptors

Interceptor	Segment	Size (in)	Slope (%)	Capacity (MGD)
Southwest				
	Ridgely Road to Screw Lift Pump Station	21	0.2	4.6
	Screw Lift Pump Station to Malloy Lane	21	0.2	4.6
	Malloy Lane to End of Line above I-24	21	0.1	3.2
	I-24 to State Route 99	18	0.12	2.4
	State Route 99 to PS R8 Force Main	18	0.12	2.4
	Pumping Station R8 to River Crossing	18	0.3	3.7
	River Crossing to Hwy 231	12	0.22	1.1
	Hwy 231 to End of Existing Line	12	0.22	1.1
Samsonite Relief				
	From Southwest Interceptor to Midpoint of Malloy Lane	21	0.16	4.1
	From Midpoint of Malloy Lane to Samsonite Blvd. West of Rutledge Way	21	0.1	3.2
	Above Samsonite Blvd.	15	0.16	1.7
Overall Creek				
	From Overall Creek Pump Station to below Asbury Rd.	36	0.07	14.8
	From below Asbury Rd. to below Mason Pk.	24	0.13	6.9
	From below Mason Pike to Puckett Creek Interceptor	21	0.15	5.2
	From joint at Puckett Creek Interceptor to Highway 96	18	0.18	3.7
	From Highway 96 to Windrow Road	15	0.19	2.4
Puckett Creek				
	Above Highway 96	21	0.28	7.1
	From below Highway 96 to Highway 99	18	0.16	3.5

3.3 *Existing Collection System*

Exhibit 3.1 illustrates the existing Murfreesboro Water & Sewer Department Collection system. As mentioned previously, the collection system is delineated by drainage basins into 12 monitoring zones. Each sector of the Planning Area, including areas currently outside the sanitary service area is also designated by a sanitary district number. An evaluation of the interceptor system included determination of the existing populations within each of these sanitary districts who were served by sewer. Table 3.5 summarizes this data.

3.4 *Potential for Serving Additional Areas*

Currently, the Murfreesboro Water & Sewer Department provides sewer service to 97% of the residents within the City Limits. In addition, the Department provides service to six customers outside the City limits, and approximately 3,332 Consolidated Utility District (CUD) water customers. Requests for sewer service in areas outside of annexation limits has offered an opportunity for the Department to sewer customers without providing additional City services such as trash pickup and fire protection. It is the intent of the Murfreesboro Water & Sewer Department to continue to provide this service to residents of the existing and future City Limits, and to also provide the service to all residents within the Planning Area by the year 2050.

It has also been the consistent policy of the Murfreesboro Water & Sewer Department to extend sewer service to interchanges along major thoroughfares, and into significant basins in the service area. Several new interchanges are either currently under design or construction throughout the City. These include the Sulphur Springs Road and Beasley Road Interchanges off of State Route 840 and the Elam Road, Manson Pike, and

Salem Road Interchanges off of Interstate 24. Significant residential and commercial growth is anticipated in the vicinity of each of these interchanges. Additionally, development within numerous drainage basins throughout the Planning Area has been projected by the Murfreesboro Planning Department. Consistent with their service policy, the Murfreesboro Water & Sewer Department intends on extending sanitary sewers to these areas as necessary. Population projections for both the City of Murfreesboro and for the unincorporated area within the Planning Area were coupled to project the number of additional customers that would be serviced for a Planning Period of 20 years and a Study Period of 50 years. These projections are described in Section 5.

Table 3.5
Populations by Sanitary District

SANITARY DISTRICT	AREA (AC.)	1990 POPULATION SERVED	2000 POPULATION
1	164	320	647
2	405	1,000	1,430
3	51	175	248
4	89	200	436
5	115	370	531
6	40	175	146
7	414	2,500	2,092
8	166	850	568
9	546	2,800	4,357
10	473	1,000	1,952
11	54	400	241
12	907	5,000	4,554
13	119	300	354
14	83	300	266
15	146	400	671
16	215	1,350	2,478
17	196	660	1,214
18	927	4,310	5,498
19	68	500	315
20	150	245	546
21	200	IND	276
22	60	IND	7
23	109	300	230
24	178	1,750	1,376
25	132	100	289
26	106	225	619
27	89	500	360
28	326	2,100	1,329
29	247	2,100	1,430
30	186	IND	504
31	193	150	311
32	94	400	557
33	703	IND	381
34	124	SCH+200	304
35	210	400	1,004

Table 3.5 (Cont'd)
Populations by Sanitary District

SANITARY DISTRICT	AREA (AC.)	1990 POPULATION SERVED	2000 POPULATION
36	199	400	201
37	42	IND	23
38	165	0	2
39	65	IND	0
40	89	IND	71
41	105	150	8
42	218	IND	653
43	180	IND	56
44	74	30	0
45	418	2,280	1,434
46	206	IND	330
47	304	200	193
48	266	IND	305
49	134	100	0
50	137	IND	13
51	33	IND	14
52	65	45	104
53	33	0	4
54	542	100	326
55	611	N/A*	190
56	748	250	452
57	433	N/A*	224
58	106	200	297
59	513	700	612
60	223	N/A*	335
61	651	3,100	2,078
62	6,218	437	5,315
63	6,931	N/A*	5,260
64	1797	400	2316
65	1959	75	2395
66	2204	N/A*	1802
67	1784	400	4132
68	1050	N/A*	452
69	657	1400	1788

Table 3.5 (Cont'd)
Populations by Sanitary District

SANITARY DISTRICT	AREA (AC.)	1990 POPULATION SERVED	2000 POPULATION
70	5265	N/A*	3544
71	4066	N/A*	2202
72	2856	N/A*	4476
73	500	N/A*	4
74	450	N/A*	291
75 (WWTP)	143	N/A*	5
76	180	IND	110
77 (SRBF)	197	N/A*	28
78	213	500	587
79	201	150	313
80	80	150	479
81	215	100	1070
83	290	N/A*	45
85 (AIRPORT)	305	75	577
86	2996	N/A*	468
87	12507	N/A*	1861
88	8086	N/A*	2963
89	6280	N/A*	1043
90	2198	N/A*	196
91	1833	N/A*	1332
92	5627	N/A*	1061
93	4259	N/A*	1750
94	3093	N/A*	1007
95	2946	400	1175
96	1308	N/A*	1045
97	3818	N/A*	1279
98	2732	N/A*	447
99	2825	N/A*	972
100	752	N/A*	694
101	1748	N/A*	948
102	1710	N/A*	629
103	394	N/A*	28
104	1751	N/A*	2869

Table 3.5 (Cont'd)
Populations by Sanitary District

SANITARY DISTRICT	AREA (AC.)	1990 POPULATION SERVED	2000 POPULATION
105	263	N/A*	16
106	415	N/A*	235
107	2873	N/A*	1155
108	894	N/A*	251
109	568	N/A*	52
110	1147	N/A*	108
111	1508	N/A*	211
112	823	N/A*	46
113	760	N/A*	75
114	427	N/A*	49
115	1162	N/A*	525
116	2383	N/A*	279
117	2193	N/A*	1107
118	1019	N/A*	584
119	1772	N/A*	330
120	1208	N/A*	463
121	1659	N/A*	287
122	1047	N/A*	184
123	1643	N/A*	898
124	6502	N/A*	927
125	911	N/A*	157
TOTALS	150,726	42,622	112,343

*N/A- Only sewer customers were tabulated in the 1992 Revision of the 201 Facilities Plan. Data was not available for the actual populations living in the respective drainage basins.

IND- Area is primarily Industrial and population figures were not available.
COM- Area is primarily Commercial and population figures were not available.
SCH- Area contains a school. Additional flow is provided in calculations.

4. INFILTRATION AND INFLOW

4.1. *Analysis of Infiltration and Inflow*

The Murfreesboro Water and Sewer Department (MWSD) began identifying Infiltration/Inflow (I/I) issues in its collection system in 1972 as part of its original EPA construction grant project. Since that time, the Department has consistently spent time and resources identifying and rehabilitating I/I sources.

4.1.1 Monitoring Program

The MWSD began a collection system flow-monitoring program in 1991. The Department contracted with a private firm who installed 15 temporary flow-monitoring stations. A study was completed on the results of the temporary monitoring program in 1996. Based on this study, the MWSD installed 12 permanent flow-monitoring stations in its collection system in 1995. Since 1995, the Department has maintained a database of real-time flow, rainfall and depth readings. The monitoring stations are equipped with pressure transducers which allow accurate flow measurements during surcharge situations.

The monitoring program documents a direct correlation between rainfall events and increases in collection system wastewater flow. Table 4.1 compares the results of the 12 permanent flow-monitoring stations for the years 1991 and 2001. The table indicates that average daily flows (ADF) in each of the 12 basins have increased between 50% and 100% over the 10-year period.

Wet weather peak flows (WWPF) have likewise increased except in areas that have received consistent rehabilitation.

4.1.2. Wet Weather Peak Flow

During the period of February 10-17, 2001, the City of Murfreesboro experienced heavy rainfalls. Graphs from each permanent monitoring station indicating flow and depth of flow are included in Appendix B. The data indicates that the capacity of each of the collectors in the 12 basins are surpassed by virtue of the surcharging effect in each.

The WWPF for each station is shown in Table 4.1. The flow meter at the Sinking Creek WWTP indicated that the plant received 38.1 million gallons of flow on February 17, 2001. This compares accurately with the surcharged readings from the Stones River Interceptor and Sinking Creek Interceptors which totaled 35.52 million gallons. The depth of flow readings in each station indicates that the water levels continued to rise above the 35.52 MG reading. Therefore, for the purpose of this report, the 38.1 MG reading at the Sinking Creek WWTP will be considered the present WWPF. The individual WWPF in each of the 12 monitored basins is shown in Table 4.1. Since the average daily wastewater flow at the Sinking Creek WWTP is 10.0 MGD, the peak measured wet weather I/I is 28.1 MGD.

Table 4.1
Recorded Average and Peak Flows in Collection System

Interceptor	1991				2001				
	Flow Meter	ADF (Flow in MGD)	WWPF (Flow in MGD)	Peaking Factor	Flow Meter	ADF* (Flow in MGD)	WWPF* (Flow in MGD)	Peaking Factor	Line Capacity
Stones River Interceptor at WWTP	M01	3.75	13.00	3.47	MF01	11.67	28.35	2.43	20.60
Sinking Creek Interceptor @ WWTP	M02	2.75	10.10	3.67	MF02	4.66	7.17	1.54	11.90
VA Interceptor	M03	0.45	1.00	2.22	MF08	0.73	3.56	4.86	3.00
Sinking Creek Interceptor @ 24"	M04	0.75	5.80	7.73	MF03	1.64	5.25	3.20	6.60
DeJarnette Lane PS	M06	0.45	2.10	4.67	MF09	1.08	2.59	2.41	3.30
Upper Sinking Creek Int	M07	0.50	2.00	4.00	MF10	0.80	5.16	6.46	4.00
Lytle Creek Interchange	M08	3.70	12.50	3.38	MF04, MF05, MF06	5.59	20.61	3.69	20.00
Lower Lytle Creek Interceptor	M10	0.18	0.80	4.44	MF04	0.90	3.87	4.29	3.20
Upper Lytle Creek Interceptor	M11	2.10	5.75	2.74	MF05	2.46	8.00	3.25	6.50
Samsonite Relief Sewer	M12	1.50	5.30	3.53	MF06	2.23	8.74	3.93	4.00
Southwest Relief Sewer	M13	0.45	1.25	2.78	MF12	0.81	6.74	8.33	2.30
Southwest Interceptor					MF 11	1.73	4.57	2.64	3.20
Bradyville Road Int.	M15	0.25	0.76	3.04	MF07	0.95	10.64	11.22	4.60

*DATA FROM PERMANENT FLOW MONITORS

4.2 *Steps to Reduce Excessive Infiltration and Inflow*

4.2.1 Background

Murfreesboro was one of the first cities in Tennessee to begin an I/I reduction program. Beginning in 1973, the City initiated an I/I reduction program in its existing collection system. This program included pilot testing of air test and sealing of pipe joints within certain areas prone to high I/I flows.

In 1976, the MWSD began its sewer system rehabilitation program with a massive test and seal program. Lines ranging in size from 8-inch to 18-inch were included. Eventually, the program tested and sealed approximately 149,000 LF of line. This initial rehabilitation program was completed in 1978.

Phase II of the Murfreesboro sewer system rehabilitation program began in 1980. This phase included 24,000 LF of testing and sealing, 1,500 LF of slip lining, 80 manhole repairs and 64-point repairs. Phase II was completed in 1981.

Phase III of the rehabilitation program was begun in 1985. This phase included 21,400 LF of testing and sealing, 3,550 LF of slip lining, and 140 manhole repairs. Phase III was completed in 1986. It was also at this time that the Murfreesboro Water & Sewer Department hired its first full-time employees dedicated to I/I reduction. This newly formed division was primarily focused on identifying and repairing problems within the collection system. Their tasks included televising sewer lines, testing and sealing

questionable joints, and repairing defects in the sewer lines and manholes.

Phase IV began in 1988. Phase IV rehabilitation centered on slip lining 5,945 LF and 1,260 LF in two 21-inch and 24-inch interceptor sewers respectively. Phase IV was completed in 1989. By this time, the Murfreesboro Rehabilitation Crew had grown in numbers to seven full-time employees.

Three more rehabilitation projects were completed in 1993, 1994 and 1997. These projects were largely focused on point repairs and manhole repairs. The last phase also included 5,730 LF of pipe lining with Instituform.

Since this time, the rehabilitation crew has grown to a force of 11 full-time employees and has achieved the bulk of the rehabilitation efforts within the collection system. Over its 16 year existence, the rehabilitation crew has dedicated over 291,000 manhours to the cause of reducing I/I from the Murfreesboro collection system. Appendix D contains additional information which summarizes the yearly production, budget, and time spent by this crew.

4.2.2 Present Condition

The Murfreesboro Water and Sewer Department began a flow-monitoring regime in 1991. Under this program, 12 permanent flow monitoring stations were installed at strategic positions within the collection system. Data from these meters is monitored constantly at the MWSD Operations and Maintenance Facility. The operation of these flow-monitoring stations has allowed the Department to maintain records and establish I/I trends in each of its major basins.

It also affords personnel the ability to identify potential problems in the collection system, and to react accordingly.

The MWSD began an annual televising program for its collection system in 1990. The Department maintains two trucks equipped with televising equipment. The results of the televising program are coordinated with flow readings and recommendations for rehabilitation are identified. Currently, the MWSD rehab crew televises approximately 350,000 linear feet of sewer lines per year. The data from these activities is cataloged and potential rehabilitation projects are scheduled accordingly. Two new trucks with digital recording and data-logging system are being purchased by the MWSD. These trucks will improve assimilation of system data and allow for improved archiving of this data.

The Department continues to expand its rehabilitation efforts, and in 1999, a construction crew was created to aid the rehab crew with the work. This crew has dedicated approximately 6,100 manhours to the effort since its inception, and has replaced over 6,700 linear feet of damaged or deteriorated pipe in that time. The entire rehabilitation program is funded annually as part of the Murfreesboro Water & Sewer Department's budget. This budget includes approximately $250,000 for payroll for the rehabilitation and construction crews, $214,000 for operating expenses, and $75,000 for capital expenditures. Additionally, a construction contract was recently bid for rehabilitation of sewers along Northfield Boulevard. The bid amount for this work was $321,665.

4.2.3 Capacity Management, Operation and Maintenance (CMOM)

Pending federal regulations will require municipal wastewater system operators to eliminate Sanitary Sewer Overflows (SSO) by 2011. Therefore, the EPA will require operators to institute a CMOM program to control and ultimately eliminate SSO's.

The MWSD has active programs which collectively constitute many of the elements of a CMOM program. Flow monitoring, cleaning, televising, mapping, capacity improvements, safety, and rehabilitation are already part of the MWSD's standard procedures.

The permanent flow monitoring stations throughout the collection system have been crucial to the preparation of this Facilities Plan. The stations offer "real-time" information as to the average daily flows (ADF) and wet weather peak flows (WWPF) encountered in the system. This type of information is integral to the preparation of a successful CMOM program. It is recommended that an additional flow monitor be installed on the Overall Creek Interceptor upstream of the Overall Creek Pumping Station. It is also advisable to install flow monitors on both the Overall Creek Interceptor and the Puckett Creek Interceptor upstream of their confluence to monitor growth within each basin. Furthermore, it is recommended that the Murfreesboro Water and Sewer Department initiate a policy that a permanent flow monitor will be installed on all new interceptor sewers (15 inches or greater in diameter) in the collection system.

MWSD staff also expressed interest in obtaining temporary flow monitoring equipment. This equipment affords several benefits to the Department. First, it would allow personnel in the Engineering Department to determine the actual amount of capacity available in

a specific line segment prior to authorizing developers to connect to that segment. Also, it would allow the Operations and Maintenance personnel to isolate sub-basins that are prone to I/I problems. Finally, it would allow the Rehabilitation Team to monitor actual results from their construction efforts. For these reasons, it is recommended that the MWSD acquire 15 of these temporary flow monitors. It is also recommended that the Department acquire a temporary flow monitor for each permanent flow monitor that is installed in the collection system.

Additional reduction of I/I in the Murfreesboro Sewer system will likely require concentration on small diameter laterals in the system. This will include service laterals for individual customers. Numerous metropolitan governments and public utilities across the country are now implementing ordinances that require property owners to correct known deficiencies in their service lines. These ordinances often authorize fines for owners who are delinquent in fixing these problems. Such an ordinance is recommended for the City of Murfreesboro to afford its personnel the authority to enforce corrective action of I/I sources in the collection system.

In the future, the Department will be required to interface all of these elements (and more) into a documented CMOM program. The program will need to be driven by goals set by the Department. As part of the discussions during this report, the Department indicated the need to reduce I/I by approximately 30% to reach the planned peak flow factor. Additional staff, equipment and rehabilitation funds may be required to achieve this I/I reduction goal.

5. FUTURE CONDITIONS

5.1 *Planning Period*

The 1992 revision of the Facilities Plan addressed both a planning period which included the period through 2013 and a study period which projected needs for the area through 2040. This update addresses a planning period through 2022 and a study period through 2050.

The Planning Area delineated under the 1992 Revision of the 201 Facilities Plan was modified recently to account for the Urban Growth Boundary approved in 2000. Additional area was added beyond the Urban Growth Boundary on the southern side of town to allow areas which can be served by gravity interceptors to be included in the planning process. Inadequate soils coupled with failing septic systems within Rutherford County has created a demand for sanitary sewer service within these areas. Exhibit 5.1 illustrates this new Planning Area as well as the previous 201 Planning Area, the current City Limits, and the Urban Growth Boundary.

5.2 *Land Use Projections*

The City of Murfreesboro Planning Department has compiled the following historical information on land use trends in Murfreesboro:

Table 5.1
Historical Land Use

Land Use	1958		1967		1984	
	acres	% of totals	acres	% of totals	acres	% of totals
Residential	1150.5	30.95	1904.1	32.40	3740.15	27.70
Commercial	92.3	2.48	156.1	2.66	861.97	6.39
Industrial	88.5	2.38	147.7	2.51	510.38	3.78
Institutional	500.00	13.45	576.4	9.81	1109.05	8.21
Streets & Hwys	473.3	12.73	766.5	13.04	1548.90	11.47
Open Space	1412.2	38.00				
TOTAL	3716.8 or 5.81 sq. mi.		5877.0 or 9.18 sq. mi.		13499.16 or 21.09 sq. mi.	

Current land use for the City of Murfreesboro is taken from the City's GIS and zoning ordinance. The land use is categorized by zoning district in Table 5.2. These zoning districts can be grouped by major use and summarized as follows:

Table 5.2
Existing Land Use

LAND USE	2001	
	ACRES	% OF TOTAL
Residential	18,043	67.83
Commercial	3,520	13.23
Industrial	3,690	13.87
Institutional	632	2.38
Parks/Open Space	715	2.69
Streets & Highways*	---	---
TOTAL	26,600 or 41.56 sq. mi.	

- included in major categories
-

The City has begun a process to identify potential land use for areas outside the current City limits, but inside the Urban Growth Boundary. The City of Murfreesboro Planning Department has undertaken two major suburban land use studies which are complete as of this date. The Blackman and Salem Road studies have been reviewed and recommendations from each have been used to develop this facilities plan.

Table 5.3
City of Murfreesboro Zoning

Zoning Code	Description	Total Acres
CBD	Central Business District	40
CF	Commercial Fringe District	170
CH	Highway Commercial District	2784
CL	Local Commercial District	162
CM	Medical District Commercial	60
CM-R	Medical District Residential	144
CM-RS8	Medical District Residential Single Family	5
CP	Commercial Park	74
CU	College & University District	631
H-I	Heavy Industrial District	2259
L-I	Light Industrial District	1431
OG	General Office District	184
OG-R	General Office District-Residential	61
P	Park	715
PCD	Planned Commercial District	47
PND	Planned Institutional District	1
PRD	Planned Residential District	416
PUD	Planned Unit Development	797
R-MO	Mobile Home District	70
RD	Duplex Residential District	341
RM-12	Single-Family Residential District	521
RM-16	Residential Multi-Family District	1256
RM-22	Residential Multi-Family District	30
RS-10	Single-Family Residential District	3305
RS-12	Single-Family Residential District	2143
RS-15	Single-Family Residential District	8020
RS-4	Single-Family Residential District	52
RS-8	Single-Family Residential District	355
RZ	Residential Zero-Lot Line District	526
	Total Acreage	**26,600**

5.3 *Population Forecast*

5.3.1 Background

Census figures for Murfreesboro and Rutherford County since the beginning of the last century have been as follows:

TABLE 5.4
Historical Population Data

YEAR	MURFREESBORO POPULATION	COUNTY POPULATION	RATIO CITY/COUNTY
1900	3,999	33,543	.119
1910	4,679	33,199	.141
1920	5,367	33,059	.162
1930	7,993	32,286	.248
1940	9,495	33,604	.283
1950	13,052	40,696	.320
1960	18,991	52,368	.363
1970	26,360	59,428	.444
1980	32,845	84,058	.391
1990	44,922	118,570	.379
2000	68,816	182,023	.378

Murfreesboro has shown sustained growth since 1900. From 1990 to 2000, the City's population increased 53.2% according to the U.S. Census Bureau. Murfreesboro is now the sixth largest city in the State, surpassing Jackson for the first time.

Rutherford County became the second most populous county in the Nashville Metropolitan Statistical Area (MSA) according to the 1990 census. From 1990 to 2000, the population of Rutherford County

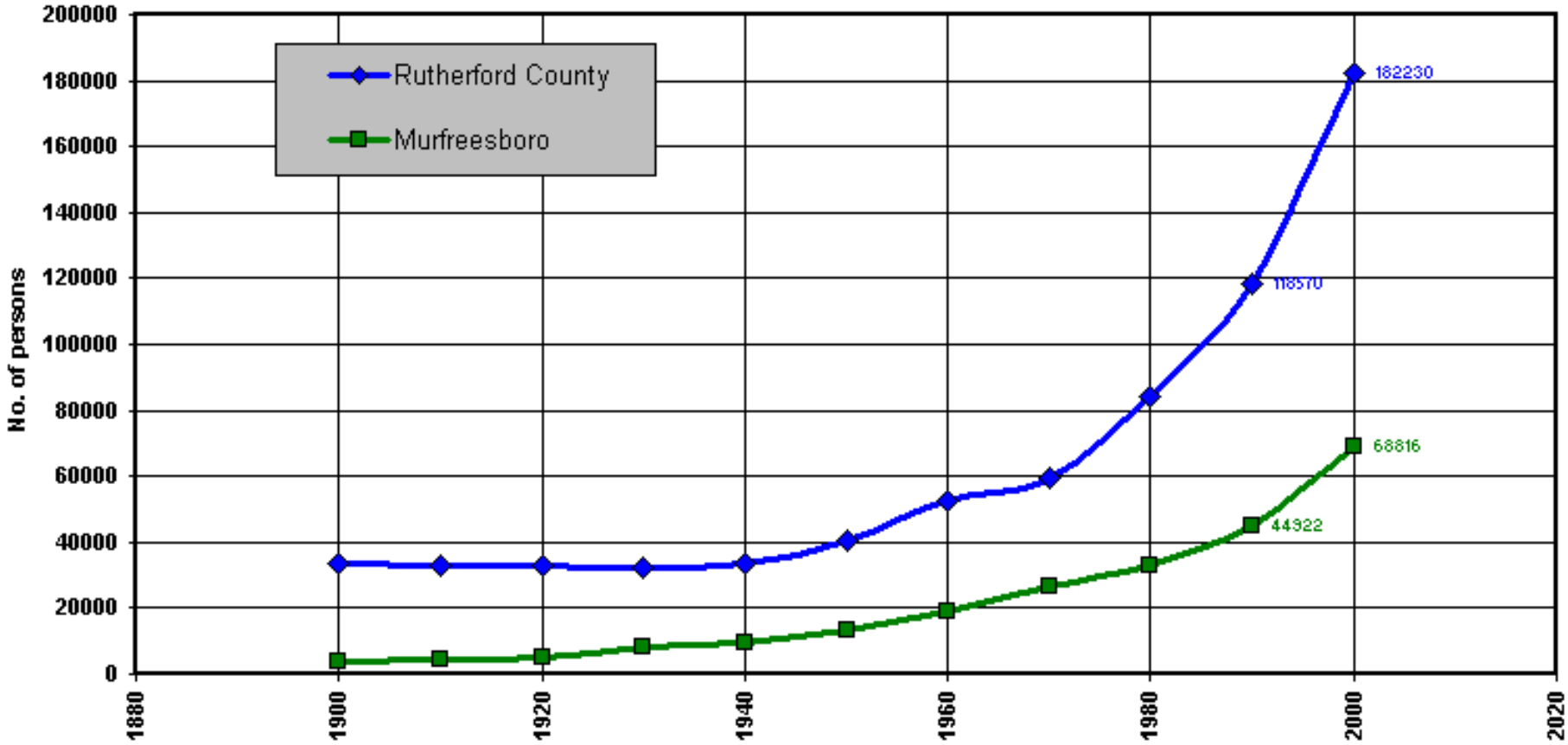
increased by another 53.5%. Rutherford County is now the fifth most populous county in the State of Tennessee.

Prior to the 1920's, Rutherford County was essentially an agricultural area, and Murfreesboro was a typical county seat, serving as the trading center for the region. With the opening of the large milk processing plants in Murfreesboro, the City changed from a trading center to a manufacturing center and the migration from the farms to the City began. During World War II, the Smyrna Air Base was constructed, and the county began to grow in the Smyrna area as well as in Murfreesboro. When the Air Base was closed in the 1960's, there was an adverse effect on the surrounding area. The county population growth essentially reflected the growth of Murfreesboro for the next decade. In fact, during the decade of the 1960's, the net increase in the county population was less than for the City of Murfreesboro. By the end of the 1960's, Murfreesboro had become firmly established as a manufacturing center and continued to grow.

The completion of Interstate Highway 24 led to a population explosion in the suburbs of Nashville. Rutherford County began growing at a rate equal to or greater than the sustained growth of Murfreesboro. The growth rate of Rutherford County was enhanced by the location of the Nissan truck assembly plant in the Smyrna area in 1983. LaVergne, located near the Davidson County line, also attracted several large industries during the 1970's. During the period from 1990 to 2000, the population of Rutherford County increased by 63,453 persons, while the population of Murfreesboro increased by 23,894 persons. The aggregate county growth rate and the growth of Murfreesboro were almost double that of the previous decade.

Figure 5-2 shows population growth for Murfreesboro and Rutherford County from the year 1900.

FIGURE 5-1
Historical Populations of
Rutherford County and Murfreesboro



5.3.2 Population Projections

The 1974 Facilities Plan population projections for Rutherford County were taken from an EPA report on “Population and Economic Activity in the US and SMSA”. This report showed the projected population of Rutherford County to be as follows:

TABLE 5.5
1974 POPULATION PROJECTIONS FOR RUTHERFORD COUNTY

YEAR	POPULATION
1980	70,500
1990	92,100
2000	113,700
2010	140,300
2020	170,800

The 1992 Update of the 201 made population forecasts based on input from various agencies including the Murfreesboro Planning Department, the State of Tennessee, and the Greater Nashville Regional Council. Population projections from the 1992 Report for the City, County, and expected sewer service area for the 20-year planning period area as well as the 50-year study area are shown below:

TABLE 5.6
1992 UPDATE POPULATION PROJECTIONS

YEAR	CITY OF MURFREESBORO POPULATION	RUTHERFORD COUNTY POPULATION	PLANNING/STUDY AREA POPULATION
2000	63,428	158,570	82,456
2010	79,440	198,600	103,272
2020	96,600	239,000	125,600
2030	112,000	280,000	145,600
2040	128,000	320,000	166,400

The 1992 Report predicted that Rutherford County would grow at the rate of 4,000 persons per year. The 2000 Census indicated that the County grew at a rate of 6,300 persons per year from 1990 to 2000. In consideration of recent economic developments and growth trends, it appears that the growth rate from 1990 to 2000 could be sustained. The ratio of City population as a proportion of County population remained constant from that of the 1990 census at .378. Using the 6,300 persons per year figure for County population growth and a .378 City to County ratio, the resulting projections are as follows:

TABLE 5.7
POPULATION PROJECTIONS ASSUMING 6,300
PPY GROWTH IN COUNTY

YEAR	CITY OF MURFREESBORO POPULATION	RUTHERFORD COUNTY POPULATION	% INCREASE
2000	68,816	182,023	
2010	92,600	245,000	34.6
2020	116,400	308,000	25.7
2030	140,200	371,000	20.5
2040	164,000	434,000	17.0
2050	187,900	497,000	14.5

In 1998, and again in 2001, the Murfreesboro Planning Department performed a detailed analysis of population growth patterns for Rutherford County and the City of Murfreesboro. This analysis included information obtained in the Special Census of 1994, 1996 and 1998, and the 2000 Census. Based on this data, the Planning Department projected that the City would grow at a variable rate of 2.3 to 5.2% per year and the County at a variable rate of 2.0 to 4.0% per year for the next twenty years. Population projection ranges from that report are shown below:

TABLE 5.8
2001 MURFREESBORO PLANNING DEPARTMENT PROJECTIONS

YEAR	CITY OF MURFREESBORO POPULATION	RUTHERFORD COUNTY POPULATION
2000	68,816	182,023
2010 Lower Limit Upper Limit	 99,294 101,694	 242,978 247,778
2020 Lower Limit Upper Limit	 128,094 140,574	 300,578 325,538

The Planning Department estimates should be considered the most reliable source for population projections. Therefore, the projections in this Report are modeled around the average of the projections from the Planning Department.

The City of Murfreesboro generally provides wastewater collection and treatment services to people located within the City limits, plus about 1,000 customers outside the City. Present policy requires that any development requesting sewer service must also request annexation before the Murfreesboro Water and Sewer Department will provide sewer service to the development. Due to the extensive development that has been occurring outside the city limits and the need to provide a planned approach to providing wastewater services for these areas immediately adjacent to the city limits, it is suggested that capacity be provided in future wastewater system facilities to adequately handle the wastewater needs of the entire Urban Growth Boundary area.

The Urban Growth Boundary (UGB) was drawn with respect to certain physical boundaries, and previous 201 planning areas for the City. In light of the dwindling supply of land that is suitable for subsurface sewage disposal systems, watershed management initiatives and the high cost of

retrofitting non-sewered areas with sewers, it is reasonable to include areas that are contiguous to and naturally drain into the UGB as part of the updated 201 Planning Area. Not all of the areas draining into the UGB area are expected to develop and have City services. For the purposes of this Report, the areas outside the UGB which will be planned for service are shown on Exhibit 5.1.

The existing population data for the UGB and extended service area are taken directly from the 2000 Census tracts. This data has been added to the population data for the City to determine the planning/study area population. Using the Murfreesboro Planning Department's projections, the expected population for the City, County and Planning Area are as follows:

TABLE 5.9
2002 UPDATE POPULATION PROJECTIONS

YEAR	CITY OF MURFREESBORO POPULATION	RUTHERFORD COUNTY POPULATION	PLANNING/STUDY AREA POPULATION
2000	68,816	182,023	112,343
2010	100,500	245,400	151,500
2020	134,300	313,000	193,200
2030	170,000	385,000	237,600
2040	206,000	457,000	282,000
2050	242,000	529,000	326,500

5.3.3 Population by Sanitary Drainage District

In order to determine the impact of current and future population projections, it was necessary to break these overall numbers down further. Through the use of the City's Geographic Information System (GIS) in conjunction with U.S. census tract information, accurate estimates of existing population [cataloged by Sanitary Drainage District] have been

determined. Projections for future population growth have likewise been catalogued by sanitary district. Table 5.10 indicates these population projections. These projections have been reviewed and accepted by the Murfreesboro Planning Department. The projections have also been reviewed by the Rutherford County Planning Department. From these projections, an analysis of future flows within the collection system was performed. Appendix C contains the data from these analyses.

Table 5.10
Population Projections by Sanitary District

SANITARY DISTRICT	AREA (AC.)	1990 POPULATION	2000 POPULATION	2020 POPULATION	2050 POPULATION
1	164	320	647	700	700
2	405	1,000	1,430	1,600	1,800
3	51	175	248	275	275
4	89	200	436	436	436
5	115	370	531	600	650
6	40	175	146	200	250
7	414	2,500	2,092	2,200	2,600
8	166	850	568	580	600
9	546	2,800	4,357	6,000	7,500
10	473	1,000	1,952	2,050	2,500
11	54	400	241	400	425
12	907	5,000	4,554	7,500	11,000
13	119	300	354	500	600
14	83	300	266	500	600
15	146	400	671	1,050	1,250
16	215	1,350	2,478	2,600	2,700
17	196	660	1,214	1,400	1,600
18	927	4,310	5,498	6,500	6,800
19	68	500	315	315	315
20	150	245	546	546	546
21	200	IND	276	IND	IND
22	60	IND	7	IND	IND
23	109	300	230	300	450
24	178	1,750	1,376	1,400	1,550
25	132	100	289	300	350
26	106	225	619	700	800
27	89	500	360	500	550
28	326	2,100	1,329	1,800	2,000

Table 5.10 (Cont'd)
Population Projections by Sanitary District

SANITARY DISTRICT	AREA (AC.)	1990 POPULATION	2000 POPULATION	2020 POPULATION	2050 POPULATION
29	247	2,100	1,430	1,800	2,000
30	186	IND	504	IND	IND
31	193	150	311	200	250
32	94	400	557	600	700
33	703	IND	381	IND	IND
34	124	SCH+200	304	SCH+200	SCH+200
35	210	400	1,004	1,500	1,750
36	199	400	201	300	400
37	42	IND	23	IND	IND
38	165	0	2	450	600
39	65	IND	0	IND	IND
40	89	IND	71	IND	IND
41	105	150	8	IND	IND
42	218	IND	653	IND	IND
43	180	IND	56	IND	IND
44	74	30	0	0	0
45	418	2,280	1,434	2,100	2,500
46	206	IND	330	IND	IND
47	304	200	193	900	1,000
48	266	IND	305	IND	IND
49	134	100	0	300	400
50	137	IND	13	IND	IND
51	33	IND	14	IND	IND
52	65	45	104	150	200
53	33	0	4	30	70
54	542	100	326	COM	IND
55	611	N/A*	190	COM	IND
56	748	250	452	500	600
57	433	N/A*	224	COM	COM
58	106	200	297	300	300
59	513	700	612	1,100	1,300
60	223	N/A*	335	500	600
61	651	3,100	2,078	2,500	3,500
62	6,218	437	5,315	13,051	22,000
63	6,931	N/A*	5,260	6,000	15,000

Table 5.10 (Cont'd)
Population Projections by Sanitary District

SANITARY DISTRICT	AREA (AC.)	1990 POPULATION	2000 POPULATION	2020 POPULATION	2050 POPULATION
64	1797	400	2316	3000	3500
65	1959	75	2395	3250	4100
66	2204	N/A*	1802	3000	6000
67	1784	400	4132	4500	5000
68	1050	N/A*	452	1200	2300
69	657	1400	1788	2090	2200
70	5265	N/A*	3544	7025	16694
71	4066	N/A*	2202	4500	8500
72	2856	N/A*	4476	10000	16000
73	500	N/A*	4	300	700
74	450	N/A*	291	300	750
75 (WWTP)	143	N/A*	5	50	75
76	180	IND	110	IND	IND
77 (SRBF)	197	N/A*	28	75	100
78	213	500	587	600	700
79	201	150	313	400	450
80	80	150	479	500	550
81	215	100	1070	1250	1500
83	290	N/A*	45	100	125
85 (AIRPORT)	305	75	577	1100	1500
86	2996	N/A*	468	700	1357
87	12507	N/A*	1861	6334	15834
88	8086	N/A*	2963	5200	7500
89	6280	N/A*	1043	2400	6000
90	2198	N/A*	196	250	1000
91	1833	N/A*	1332	3348	8369
92	5627	N/A*	1061	4185	8369
93	4259	N/A*	1750	14645	29291
94	3093	N/A*	1007	1350	1700
95	2946	400	1175	1250	2300
96	1308	N/A*	1045	2511	4184
97	3818	N/A*	1279	5021	8369
98	2732	N/A*	447	600	1800
99	2825	N/A*	972	1000	3200
100	752	N/A*	694	2092	4184

Table 5.10 (Cont'd)
Population Projections by Sanitary District

SANITARY DISTRICT	AREA (AC.)	1990 POPULATION	2000 POPULATION	2020 POPULATION	2050 POPULATION
101	1748	N/A*	948	4097	6828
102	1710	N/A*	629	3000	6000
103	394	N/A*	28	800	1200
104	1751	N/A*	2869	2520	4000
105	263	N/A*	16	250	500
106	415	N/A*	235	315	397
107	2873	N/A*	1155	1800	2500
108	894	N/A*	251	1500	525
109	568	N/A*	52	125	176
110	1147	N/A*	108	135	226
111	1508	N/A*	211	550	2000
112	823	N/A*	46	110	200
113	760	N/A*	75	150	250
114	427	N/A*	49	120	130
115	1162	N/A*	525	650	750
116	2383	N/A*	279	325	350
117	2193	N/A*	1107	1500	1400
118	1019	N/A*	584	900	1100
119	1772	N/A*	330	703	800
120	1208	N/A*	463	500	750
121	1659	N/A*	287	600	1000
122	1047	N/A*	184	200	2000
123	1643	N/A*	898	1200	1450
124	6502	N/A*	927	3422	15000
125	911	N/A*	157	200	250
TOTALS	150,726	42,622	112,343	193,230	326,500

*N/A- Only sewer customers were tabulated in the 1992 Revision of the 201 Facilities Plan. Data was not available for the actual populations living in the respective drainage basins.

IND- Area is primarily Industrial and population figures were not available.
COM- Area is primarily Commercial and population figures were not available.
SCH- Area contains a school. Additional flow is provided in calculations.

6. DEVELOPMENT OF ALTERNATIVES

Determination of future improvements for the Murfreesboro Water & Sewer Department sewage collection system was made upon the outcome of a "Decision Matrix". This matrix provided a framework from which the answers to reasonable questions led to a definitive decision between alternatives for providing sewer service to various sectors of the Planning Area. The "Decision Matrix" is illustrated as Figure 6.1.

6.1 *Evaluated Alternatives*

Potential improvements to the collection system were limited to one of six alternatives. These alternatives are tabulated and summarized below:

A. **No Action** -This option was only considered in instances where the existing collection system had sufficient capacity to meet the projected flows for the tributary area through the 20-year Design Period. Portions of the system where "no action" is appropriate should have significant useful design life and little material degradation. Furthermore, the area would have to demonstrate a low propensity for Infiltration/Inflow problems to be considered for "No Action". While this option obviously provides the lowest cost alternative for the Water & Sewer Department, is does not allow for continued growth within the tributary area.

B. **System Rehabilitation** -This option is only recommended for portions of the collection system that currently provided sufficient capacity for the tributary area including projected flow increases through the Design Period, that exhibit signs of excessive Infiltration/ Inflow during rain events. While this option does not provide additional capacity for future growth, it

is expected that additional capacity would be available by reducing extraneous water from the collection system.

C. **Replace Existing System** - Replacement of existing facilities is warranted in areas of the system that have significantly exceeded their useful design lives. Another criteria which could lead to this alternative is excessive I/I within or visible degradation of the existing system. In instances where replacement of an existing system is recommended, it is further recommended that the proposed system be sized to carry the projected flows for the 50-year Study Period.

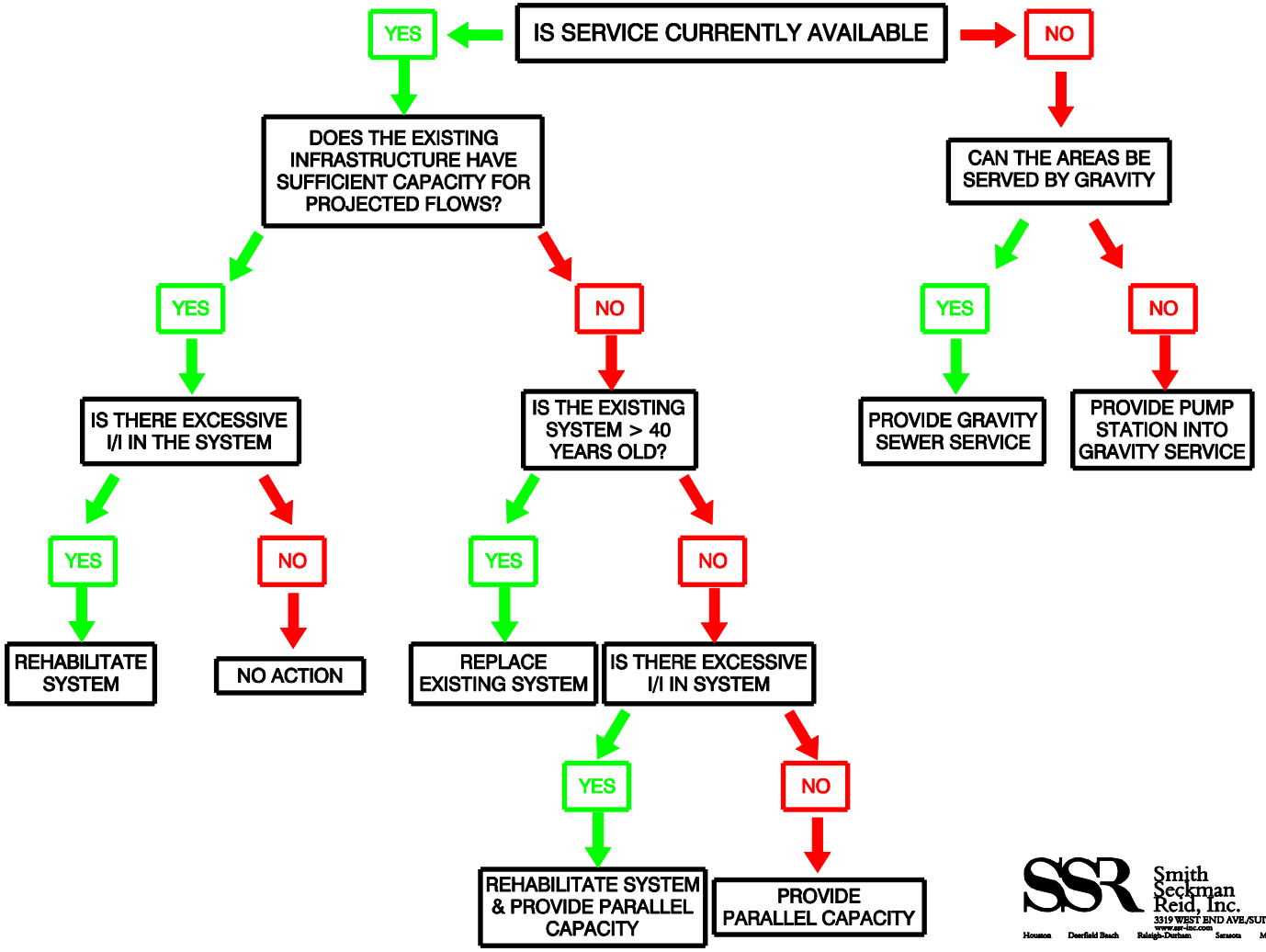
D. **Provide Parallel Capacity** - Numerous systems exist within the City Limits that have reached or are approaching their current carrying capacity since the last Facilities Plan. While these systems are not in immediate need for replacement, additional capacity is required to provide for additional flow from developing areas. This parallel capacity can be provided either by physically paralleling the existing facilities, or by diverting flow from one system into a relief sewer. This method is preferable in areas where dense development has occurred along the route of existing facilities. It is advisable to avoid construction of major collection system improvements around heavily populated areas, if possible.

E. **Provide Parallel Capacity and Rehabilitate Existing System** - Likewise, there are components of the existing system which will require additional capacity to convey future flows and which require rehabilitation to correct physical deficiencies and excessive levels of I/I.

F. **Provide Sanitary Sewer Service** - In areas which are currently not served by MWSD, collection systems were planned to convey projected sewage flows to the existing facilities through the most

practical route. Obviously, it is desirable to convey these flows via gravity interceptors, if possible. However, due to topographic limitations, numerous pump stations were required to transfer flows from other basins into the existing collection system. In each case, the proposed collection system was sized to carry projected flows for the Design Period of 20 years.

FIGURE 6.1
COLLECTION SYSTEM DECISION MATRIX



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6.2 *No-Action Alternative*

As stated previously, the “No-Action” alternative was only recommended for areas of the existing collection system which did not exhibit signs of excessive I/I, have adequate useful life, and were not experiencing growth sufficient to exceed the capacity of existing facilities. Due to the consistent levels of growth in the Murfreesboro area, this option was only utilized in areas that are currently fully developed and have sufficient capacity in the existing collection system.

6.3 *Chosen Alternatives*

Results from the decision matrix were discussed with MWSD personnel and utilized in the selection of alternatives for future implementation. The chosen alternatives were then categorized by a descriptive name associated with their vicinity as well as a numeric code which identified the area’s location with respect to the individual Sanitary Drainage Districts. The improvements were further categorized by the urgency with which they will be required. Short Range improvements are those that should be initiated immediately (0-5 years) due to hydraulic limitations in the existing system or heavy development in the vicinity. Medium Range improvements should be initiated within the next 5 to 15 years. They are improvements required to sustain levels of projected growth within the Design Period without exceeding the capacity of the tributary collection system. Long Range improvements (greater than 15 years) typically are those that are required to serve remote areas of the Planning area, or to allow for greater than expected growth in certain sectors of the Planning Area. Table 6.1 summarizes each of these recommended improvements for the Murfreesboro Water and Sewer Department collection system. Appendix D further breaks these improvements into their respective Sanitary Districts and assigns unit costs to each segment.

TABLE 6.1
RECOMMENDED SYSTEM IMPROVEMENTS

SYSTEM	CHOSEN ALT.	RATIONALE	PRIORITY
Stones River	Parallel Capacity	Near Capacity, Probable Development, 27 Year Old Line	Medium Range
Sinking Creek	Parallel Capacity	Near Capacity, Probable Development, 32 Year old line	Short/ Medium Range
Salem/Barfield System	Provide Service	No existing Service, Development Underway	Short Range
Riverdale System	Parallel Capacity/ Replace Pump Station	Near Capacity, Probable Tributary Development, 30 Year Old Line & Pump Station	Short Range
Elam Rd/ Buchanan Rd System	Provide Service	No existing Service, Development Planned	Short Range
Medical Center Parkway	Provide Service	No existing Service, Development Planned	Short Range
Lower Lytle Creek	Parallel Capacity	Near Capacity, Probable Development, 30 Year Old Line	Medium Range
Upper Lytle Creek	Provide Service	No existing Service, Development Likely	Medium Range
Bradyville Rd	Parallel Capacity, Replace Existing System	Near Capacity, Development Unlikely , 25 Year Old Line that has been Partially Rehabilitated	Short/ Medium Range
Bushman Creek	Replace Existing System/ Parallel Capacity	Near Capacity, Probable Development, 25 Year Old Line	Short/ Medium Range
Northeast Interceptor	Parallel Capacity/ Replace Existing System	Near Capacity, Probable Development, 25 Year Old Line, Sections of Line badly deteriorated	Medium Range
Veteran's Administration (VA) Interceptor	Parallel Capacity/ Replace Pump Station	Near Capacity, Probable Development, 27 Year Old Line	Short/ Medium Range
US 41/ SR 840 System	Provide Service	No existing Service, Development Likely	Short/ Medium Range

TABLE 6.1 (Cont'd)
RECOMMENDED SYSTEM IMPROVEMENTS

SYSTEM	CHOSEN ALT.	RATIONALE	PRIORITY
Northern Collection System	Provide Service	No existing Service, Development Unlikely	Long Range
Sulphur Springs System	Provide Service	No existing Service, Development Likely	Long Range
Stewart Creek System	Provide Service	No existing Service, Development Likely	Long Range
Overall Creek Interceptor	Provide Serive	No existing Service, Development Likely	Medium/ Long Range
Puckett Creek Interceptor	No Action	No existing Service, Development Likely	Short/ Medium/ Long Range
East Fork System	Provide Service	No existing Service, Development Likely	Long Range
Walter Hill System	Provide Service	No existing Service, Development Likely	Long Range
Samsonite Relief Sewer	No Action	Development Likely, Sufficient Capacity	N/A
Southwest Interceptor	Parallel Capacity	Near Capacity, Probable Development, 25 Year Old Line	Medium Range

7. SELECTED PLAN DESCRIPTION

The following is a detailed description of each improvement as tabulated in Table 6.1. While it is anticipated that the exact route of each of these improvements will be determined during detailed design and construction of the facilities, these descriptions provide the framework for proper planning within the collection system.

7.1 *Detailed Description of Chosen Alternatives*

Stones River Relief- The Stones River Interceptor was constructed in 1974 to convey flow from the old Broad Street Sewage Treatment Plant to the newer Sinking Creek Wastewater Plant. This line was sized at that time to handle the expected flows over a 40-year design life. That design life is nearly two-thirds complete, however the interceptor appears to be in good condition, and replacement of the sewer is not recommended. Also, because of the size and condition of the interceptor, a system-wide rehabilitation approach is also not recommended. It is recommended, however, that parallel capacity be constructed to provide for impending growth in the southern and western sectors of the Planning Area. Due to topographic constraints, development along the Stones River, and the presence of the City's Greenway along the existing interceptor, alternative routes were evaluated for this system. The chosen route was deemed the least disruptive option for the residents of Murfreesboro, although the depth of the sewer line in certain areas will likely provide construction challenges during installation.

It is recommended that the Stones River Relief System be sized to convey the projected flows through the end of the Study Period. Accelerated growth is likely to the south and southwest of the existing City Limits, and it would be short-sighted to construct an interceptor of this magnitude for anything less than a 40 year design life. For this reason, a 60-inch gravity collection system was

proposed for construction from the Sinking Creek Wastewater treatment plant to the screw lift station on Old Fort Parkway. It is anticipated that the existing collection system in this area is sufficient for approximately ten more years, however the parallel system should be constructed by the end of that period.

Sinking Creek Relief Sewer- The Sinking Creek Interceptor was constructed in 1969 to provide service to the Northern sector of the City of Murfreesboro, and to the Middle Tennessee State University. Slightly less than one-half of the current flow generated within the City Limits is conveyed to the treatment plant via this system. While continued growth in the area tributary to this system is expected through the Design Period, this growth is expected to be slower than in the southern portion of the Planning Area. It is for this reason that the bulk of the system improvements in this basin were classified as Medium Range projects. The exception, however, is the portion of the interceptor from the Sinking Creek Wastewater Treatment Plant to the intersection with the Veterans Administration (VA) Interceptor. This section of the interceptor is believed to be a hydraulic bottleneck during peak flow conditions in the system. It is recommended that parallel capacity be constructed in this area within the next five years.

Upper & Lower Lytle Creek Interceptors - While sanitary service is available in the downstream area of the Lytle Creek drainage basin, anticipated development in the basin will likely generate flows in excess of the existing capacity. Plans have already been generated for extension of the Lytle Creek Interceptor further into the drainage basin. Opposition by a major property owner in the area have shelved these plans, however anticipated development within the area will likely revive the project. This project is classified as Medium Range due to the uncertainties associated with the timing of future development.

Bradyville Road Relief Sewer - The area contained within this drainage basin is nearly built-out at the present time. Additional growth in the area will likely be limited, therefore to redevelopment of existing parcels. As this type of activity is

difficult to predict and is not expected to occur within the Design Period, the parallel capacity recommended for this basin is classified as a Medium Range Improvement. The downstream portion of this system was rehabilitated over a number of years through outside construction contracts and force-account work. The upstream portion from Minerva Drive has not been rehabilitated and is in immediate need of this work. This segment is therefore classified as a Short Range improvement, and it is recommended that in-house personnel complete this work when possible.

Bushman Creek Relief System - Continued growth within this collection system has necessitated the replacement of the DeJarnette Lane Pump Station (No. 14) and Force Main. This project is currently under design and slated to begin construction in 2002. Along with this construction, MWSD anticipates abandoning Pump Station #15 and conveying its flow through an interceptor into the Compton Road Pump Stations. This project is delineated as a Miscellaneous project and is classified as a Short Range Improvement. The recent construction of the Haynes Drive Relief Sewer provided additional capacity downstream of this pump station which should be sufficient through the Study Period. MWSD personnel have identified the section of gravity sewer immediately upstream of this station as a badly deteriorated segment. Replacement of this section of line by force-account labor is recommended immediately in this area. Additional capacity will also be required further upstream in the basin as growth continues in the basin. Parallel capacity is therefore recommended upstream of Pump Station #14 and is classified as a Medium Range Project.

Salem/ Barfield Interceptor System- Construction of the new interchange from I-24 to Highway 99 is anticipated to spur rapid and dense growth in the Salem/Barfield area to the south of Murfreesboro. Plans are essentially complete on the interceptor system, and a bid date is anticipated in early 2002. Phase I of this project will serve several potential subdivisions in the basin. Due to the volatile nature of development in areas like this, the proposed system is not sized

to carry the ultimate buildout of the area. Parallel capacity may be required as development in the area continues. It is also anticipated that Phase II of the system will be constructed to serve additional development in the area. Phase III incorporates parallel capacity to the existing sewer system. This will be required as flows from the area increase and capacity in the existing 15-inch interceptor is depleted. Phase I is classified as a Short Range Project and will likely be bid during 2002. Phases II and III are classified as Medium Range Projects due to uncertainty as to the likelihood of dense development in the basins.

Elam Road/ Buchanan Road Interceptor System- Similar to the Salem/Barfield System, this system of interceptors and pump stations is being planned to serve rapid growth due to the impending interchange from I-24 to Elam Road, and the recent interest of a group of investors in developing tracts of land around the existing Buchanan Road interchange. This system is also scheduled for bidding in early 2002 and is therefore classified as a Short Range Project.

Medical Center Parkway- The City of Murfreesboro currently owns a number of tracts along Thompson Lane in the vicinity of Manson Pike and the Stones River Battlefield. Development of these properties into a new medical center, doctor's offices, and associated businesses is currently under design. In addition, the City intends on using the site for beneficial reuse of wastewater plant effluent. This system is also scheduled for bidding in early 2002 and is therefore classified as a Short Range Project.

Southwest Interceptor- Sanitary sewer service most of the area south of I-24 is provided through the Southwest Interceptor and the Southwest Interceptor Extension. The anticipated rapid growth in this sector of the City will necessitate upsizing of both systems. Flow in the existing interceptor system appears to be heavily influenced by rainfall events in the drainage basin (reference Appendix B), and are less than 40 years old. From the Decision Matrix therefore, these

interceptors and their tributary collection systems are excellent candidates for sewer system rehabilitation. However, due to the projected flow rates from this drainage basin and basins tributary to it, it is also recommended that parallel capacity be constructed to relieve the existing system and provide for continued growth in the area. This project is classified as a Short Range improvement due the fact that the current average daily flow rate exceeds 65% of the design capacity of the interceptor along certain segments of the line.

It is also recommended that the Riverdale Pump Station be replaced due to its age, anticipated loading and condition. This station was originally built in 1974 and was never designed to handle the flows projected through the Design and Planning Periods. The station is extremely deep, very difficult to maintain, and in danger of mechanical failure. Data collected from the station indicates that the average cycle time on the existing pumps is less than three minutes. This situation is extremely hard on the motors and could cause mechanical problems in the near future. The condition is compounded by the fact that the wetwell is extremely small. The station should be replaced with a more reliable, more operator friendly station that can be expanded to meet the projected 2050 flow rates. It is expected that the force main from this station will likewise require parallel capacity.

Northeast Interceptor- The Northeast Interceptor was constructed in 1976 to convey flow from the area north of MTSU into the Bushman Creek Interceptor. The line primarily served trailer parks until recently, and Infiltration/ Inflow problems have plagued the system for years. Consistent rehabilitation of the system appears to be working in the system, as peak flows have continued to decline since the 1996 Infiltration/ Inflow Study. While rapid growth in this area is not expected, there will likely be consistent growth in the undeveloped tracts tributary to this system. Parallel capacity is recommended for this area, however it is not a critical item at this time. Growth should be monitored in the basin and should be checked against flow rates measured at the monitoring station at the

DeJarnette Lane Pump Station. MWSD personnel are currently investigating this system for I/I problems. Depending upon their findings, it may be advisable to replace the existing sewer lines with larger diameter pipelines instead of simply paralleling the existing facilities. Because the need for parallel capacity is dependent upon growth in the area, and replacement of the system will be dependent upon the findings of the rehabilitation team, this project is classified as a Medium Range Improvement.

Veteran's Administration (VA) Interceptor - The VA Interceptor was constructed in 1974 to provide sanitary sewer service to the Veteran's Administration Hospital and residents in the northern sector of town. A series of pump stations along Thompson Lane/Compton Road were subsequently constructed to convey sewage from areas draining naturally to the East Fork of the Stones River on the eastern side of Memorial Boulevard.

Steady growth has occurred in the area, and numerous large tracts of land in the area offer the possibility of continued sporadic growth. This growth will necessitate parallel capacity to subsidize the capacity of the 18" sewer from the Thompson Lane Pump Station (No. V10) to the VA hospital. This pump station is also showing signs of age and should be replaced in the near future. Because growth in the area is not expected to be rapid or intense, construction of a parallel interceptor is classified as a Medium Range Project. Replacement of the pump station, however, may be a more pressing issue as the station nears the end of its useful life. The replacement station should be designed to be more operator friendly than the existing "canned station" design and should allow space to increase the capacity to the projected 2050 flow rate.

Samsonite Relief Sewer- The Samsonite Relief Sewer was constructed in 1972 to transfer a portion of the flow from the industrial area near I-24 and Samsonite Boulevard from the Stones River Interceptor to the Southwest Interceptor. Continued industrial growth has occurred in the area, and the sewer has

performed its duty of relieving peak flows from the Stones River Interceptor. It does not appear that additional capacity will be required on this line segment, however due to the proposed improvements to the Southwest Interceptor and Stones River Interceptor. No Action is therefore recommended for this system.

Overall Creek/ Puckett Creek System- Anticipated rapid development in the area surrounding the new Blackman School led to the construction of the Overall Creek/ Puckett Creek collection system. Easy access from SR-840 and I-24 are expected to add to the popularity of this area. The capacity of the Overall Creek Pump Station is currently 5 MGD. This capacity will likely be reached within the Design Period, necessitating an expansion of the station. This station was designed to be easily expanded to an ultimate capacity of 15 MGD average daily flow, however. This should be sufficient to convey the projected flows during the Study period. It is likely that paralleling of the interceptors will be required within this Study Period, however No Action is recommended at this time along the existing interceptors. It is recommended that additional interceptors be constructed to provide service to areas of potential development in the area, however. Extension of the existing interceptors could provide sewer service to numerous areas including the Rockvale School.

US-41/ SR-840 Collection System- Growth in the Blackman area will likely also lead to commercial growth along Nashville Highway (US 41) in the vicinity of the SR-840 Interchange. This area is currently unsewered, therefore it is recommended that service be provided in the near future. This project is recommended as a Medium Range improvement due to uncertainty associated with impending development in the area.

Sulphur Springs Collection System- The area northwest of the Sinking Creek Wastewater Treatment Plant in the vicinity of the Leanna Township has shown limited growth potential over the last several years. Public meetings have indicated that a number of residents in the area favor urban growth, however

annexation has not been requested yet. For this reason, this improvement is classified as a Long Term Improvement.

Northern Collection System- Development within the unincorporated area to the northwest of the City Limits appears unlikely in the foreseeable future. Sanitary sewer service to the area is also difficult due to the prevailing drainage pattern in the area. This area drains naturally into the West Fork of the Stones River downstream of the Sinking Creek Wastewater Treatment Plant, necessitating a system of pumping stations to convey flow back to the treatment facilities. It is unlikely that this system will be required during the Planning Period, therefore the Northern Collection System is classified as a Long Term Project.

East Fork Collection System- Likewise, development to the northeast of the existing City Limits appears unlikely in the near future. The residents of this area have publicly stated that they do not want urbanization. The area also drains naturally into the East Fork of the Stones River, necessitating a system of numerous pump stations to convey flow into the VA Interceptor. For these reasons, the East Fork Collection System is classified as a Long Term Project.

Walter Hill Collection System- Although the residents of Walter Hill have stated publicly that they support growth and urbanization within the area, the area is too remote to easily provide sanitary sewer service. Service would require several pump stations as well as a costly crossing of the East Fork of the Stones River. For these reasons, the Walter Hill Collection System is classified as a Long Term Project.

Stewart Creek Collection System- Although Highway 96 serves as a major thoroughfare into the City from the West, it is uncertain whether sanitary sewer service would be desirable in the area. Adequate soils in the area allow development to occur through the installation of septic systems. Sanitary Service

is complicated by the natural drainage of this area into Stewart Creek. This drainage pattern would necessitate several pumping stations to provide service to the area. Due to the uncertain future of this area, this project is classified as a Long Term Project.

7.2 *Public Involvement/ Public Meeting*

This planning document will be presented to the Murfreesboro Water & Sewer Board, and then to the Murfreesboro City Council for approval. Upon approval of the document, a public meeting will be scheduled and advertised in the local media. A transcript of that meeting will be attached to this document after that date.

8. PROJECT COSTS

Project costs were compiled for each proposed improvement using recent bids in the Middle Tennessee area as a guide. These costs are budgetary in nature and should be confirmed during the design of each improvement. Each cost presented is a construction cost exclusive of land acquisition costs. These costs are also present value estimates, and no allowance has been made for inflation that will occur between now and the actual construction date.

8.1 *Estimated Construction Costs and Overall Project Costs*

Each proposed improvement in the Murfreesboro collection system has been categorized by the collection system in which that project is located. Additionally, each project was assigned a project number which corresponds to the Sanitary District in which that project is located. Table 8.1 summarizes each major collection system and the estimated construction costs of the proposed improvements for each. The priority associated with these improvements is also reiterated from Section 6. A complete list of each proposed segment and/or improvement is included in Appendix D. Each of the proposed improvements are illustrated on Exhibits 8.1 through 8.4.

Table 8.1
Estimated Costs of Proposed Improvements

COLLECTION SYSTEM	PROPOSED IMPROVEMENT	ESTIMATED PROJECT COST	PRIORITY
Stones River	Parallel Capacity	$21,216,000	Short Range
Sinking Creek	Parallel Capacity	$8,664,240	Short/ Medium Range
Salem/Barfield	Provide Service	$9,792,640	Short/ Medium/ Long Range
Southwest	Parallel Capacity/ Replace Pump Station/ Rehabilitation/ Provide Service	$22,361,040 *(Excluding system rehabilitation)*	Short/ Medium Range
Elam Rd/ Buchanan Rd	Provide Service	$7,254,130	Short Range
Medical Center Parkway	Provide Service	$4,092,530	Short Range
Lower/Upper Lytle Creek	Provide Service/ Parallel Capacity	$22,498,320	Medium/ Long Range
Bradyville Road	Parallel Capacity/ Replace Portions of Existing System	$2,920,320	Short/ Medium Range
Bushman Creek	Parallel Capacity/ Replace Portions of Existing System	$12,248,340	Short/ Medium Range
Northeast	Parallel Capacity/ Replace Portions of Existing System	$2,826,720	Medium Range
Veteran's Administration (VA)	Parallel Capacity/ Replace Pump Station	$5,337,280	Medium/ Long Range
US 41/ SR 840	Provide Service	$7,382,440	Medium Range
Northern	Provide Service	$22,419,540	Long Range
Sulphur Springs Rd	Provide Service	$2,721,420	Long Range
Stewart Creek	Provide Service	$7,116,200	Long Range
Overall Creek/ Puckett Creek	Provide Service	$15,348,580	Short/ Medium/ Long Range
East Fork	Provide Service	$13,564,980	Long Range
Walter Hill	Provide Service	$3,608,800	Long Range
Samsonite Relief	No Action		
Miscellaneous Other Improvements	Provide Service	$2,832,440	Short/ Medium Range
	TOTAL COST	**$194,205,960**	

8.2 *Proposed Financing*

The Murfreesboro Water & Sewer Department has historically utilized all available means for the financing of necessary infrastructure additions and repairs. These means have included the use of municipal bonds, loans from the Tennessee Municipal League, loans from the Clean Water State Revolving Loan Program, the use of assessment district fees and the use of reserve funds. Funding for the proposed system improvements will likely utilize a mix of each of these sources, and the decision of which to use will undoubtedly be made on a case-by-case basis.

In some cases the length of time required to fully build-out areas within assessment districts may exceed the period established by ordinance. In such cases the ordinance should be amended to allow sufficient time for full recovery of MWSD costs within the individual assessment districts.

8.3 *Projected Operating Costs and User Charge Structure*

It is anticipated that the conclusions stated within this Facility Plan will be utilized during the preparation of a third party rate study. This rate study will likely recommend an increase to the existing rate structure to account for repayment of any bonds or loans required to implement each improvement.

9. ENVIRONMENTAL IMPACTS

9.1 *Planning Area and Project Area*

The planning area for this 201 Facilities Plan Update is indicated on Exhibit 5.1. The planning area includes all of the City of Murfreesboro present service area, as well as the area within Murfreesboro Urban Growth Boundary (UGB).

In addition, the planning area includes certain drainage basins which are contiguous to the UGB and drain naturally into the UGB.

The total planning area encompasses some 203 square miles. All of the planning area is contained within Rutherford County. All planning collection system improvements for the City of Murfreesboro are contained within this planning area.

9.1.1 Brief Project Description

The projects proposed in this 201 update are intended to provide adequate wastewater collection system capacity for the City of Murfreesboro and its service area for the study period. Projects will alleviate current overloading conditions, replace portions of the system that have reached the end of their life, provide additional capacity and serve new areas within the planning area. Full projection descriptions are found under Section 7.

9.2 *Project Specific Impacts*

Construction of the proposed collection system improvements will require extensive excavation in the vicinity of several creeks and the Stones River. This will represent the area of greatest environmental concern for the projects. To prevent pollution of water bodies by eroded soil from the construction site, measures such as silt fencing, temporary settling ponds, and geotextile slope protection will have to be implemented during construction. Other measures may also be implemented including restrictive work hours to mitigate unnecessary noise pollution of the nearby residences and sprinkling or application of calcium chloride to mitigate excessive dust pollution of the project area during construction.

Soils in the project areas are generally classified into one of two categories. The first of these classifications includes the alluvial deposits. Silty clay loams from the Eagleville, Cumberland, and Lomond classifications encompass most of the areas. The other category includes various rock outcroppings form the Gladeville and Bradyville classifications. Construction of the projects will likely entail excavation of a mixture of rock and alluvial soil.

There are no known archaeological sites located along the planning project sites with one exception. A certain archaeological remains have been found along the Buchanan Road Interceptor route. A Phase II investigation is currently underway.

Interdisciplinary Environmental Review by State and Federal Agencies did not identify any listed, protected, or endangered flora or fauna in the vicinity of the project area. Protective measures including silt fences and settling ponds will be implemented to prevent pollution of adjacent

streams. These measures will also protect the fish and wildlife population surrounding the project areas.

The projects are not located along any designated Wild or Scenic Rivers. There are no known wetlands in the vicinity of the projects. It is not anticipated that any special construction activities will be required to protect these entities.

The City of Murfreesboro obtains raw water for its drinking water supply from two locations. The first of these is located adjacent to the water treatment plant site on the East Fork of the Stones River. The second intake is located in the backwaters of the Percy Priest Reservoir near the confluence of the East Fork of the Stones River. Neither of these intakes are located in areas where contamination from these projects would be an issue.

Although there are a number of residences surrounding the project areas, the impact on those residences should be minimal during construction of this project. No displacement of any residences should be necessitated during construction. Continuous sewer service will be provided through bypass pumping for all customers located in the project areas. Tunneling of road crossings will be examined during design to prevent the closure of roadways during construction. It is anticipated that only temporary closures of one lane of traffic will be required during construction of any improvements.

Several crossings of a water bodies will be necessitated during construction of these projects. The Corps of Engineers, the Tennessee Valley Authority, and the Tennessee Department of Environment and Conservation will be contacted regarding these crossings during the project design phase(s). Some construction will be covered under the

COE DA Nationwide Permit #12, and the TDEC General Permit. Construction of all crossings will include all preventative measures called for under any required permits.

Some of the proposed improvements may be located in the 100-year flood plain. Actual flood plain intrusion will be indicated on finished design documents. All applicable permits and permit requirements will be addressed at that time as part of the contract documents.

The facilities proposed under this project are for the conveyance of sewage only, and no generation or deposition of biosolids will occur.

APPENDIX A

DETAILED ANALYSIS OF COLLECTION SYSTEM

ANALYSIS OF CAPACITY

SINKING CREEK INTERCEPTOR

1. From Junction Box at WWTP to Thompson Lane

   a. Sewer - 30” at 0.20% Min. Grade

   b. Capacity - 11.9 MGD Full
   10.0 MGD 0.7 Full

   c. Present Condition - 4.7 MGD Average, 7.2 MGD Peak

   d Projected Sewage Flow for the Planning Period

   7.7 MGD Average
   23.2 MGD Peak

   e. Projected Sewage Flow for the Study Period

   9.1 MGD Average
   27.2 MGD Peak

   f. Requires a parallel 42” line within the Planning Period.

   g. The above modification will be adequate for the Study Period.

---

2. From Thompson Lane to Sulphur Springs Road

   a. Sewer - 27” at 0.20% Min. Grade

   b. Capacity - 9.0 MGD Full
   7.5 MGD 0.7 Full

   c. Present Condition - 3.7 MGD Average
   11.2 MGD Peak

   d. Projected Sewage Flow for the Planning Period

   5.6 MGD Average
   16.7 MGD Peak

   Projected Sewage Flow for the Study Period
   6.5 MGD Average
   19.6 MGD Peak

e. Requires a parallel 36” line or replacement with a 48” dia. Line during the Planning Period.

f. The above modification will be adequate during the Study Period.

---

3. From Sulphur Springs Road to Maitland

a. Sewer - 24” at 0.20% Min. Grade

b. Capacity - 6.6 MGD Full
5.5 MGD 0.7 Full

c. Present Condition - 1.6 MGD Average
5.3 MGD Peak

d. Projected Sewage Flow for the Planning Period
1.9 MGD Average
5.8 MGD Peak

Projected Sewage Flow for the Study Period
2.2 MGD Average
6.7 MGD Peak

e. Existing line will reach capacity during the Planning Period.

f. Existing line will become overloaded during the Planning Period.

---

4. From Maitland to Bell Street

a. Sewer - 21” at 0.15% Min. Grade

b. Capacity - 4.0 MGD Full
3.4 MGD 0.7 Full

c. Present Condition - 0.9 MGD Average
2.7 MGD Peak

d. Projected Sewage Flow for the Planning Period
1.1 MGD Average
3.2 MGD Peak

Projected Sewage Flow for the Study Period
1.2 MGD Average
3.5 MGD Peak

e. Requires a parallel 27” line or replacement with a 36” line during the Planning Period.

f. The above modification will be adequate for the Study Period.

---

5. From Bell Street to College Road

   a. Sewer - 18” at 0.20% Min. Grade

   b. Capacity - 3.0 MGD Full
      2.5 MGD 0.7 Full

   c. Projected Sewage Flow for the Planning Period
      1.6 MGD Average
      4.6 MGD Peak

      Projected Sewage Flow for the Study Period
      2.0 MGD Average
      5.5 MGD Peak

   d. Requires replacement with a 30” line or a parallel 24” line during the Study Period.

   e. The above modification will be adequate for the Planning Period.

---

6. Above College Road

   a. Sewer - 12” at 0.40% Min. Grade

   b. Capacity - 1.5 MGD Full
      1.2 MGD 0.7 Full

   c. Projected Sewage Flow for the Planning Period
      1.5 MGD Average
      4.1 MGD Peak

      Projected Sewage Flow for the Study Period
      1.8 MGD Average
      5.1 MGD Peak

   d. Requires replacement with 30” line or a parallel 27” line within the Study Period.

   e. The above modification will be adequate during the Planning Period.

ANALYSIS OF CAPACITY
V.A. HOSPITAL SEWER

1. From Sinking Creek Interceptor to Thompson Lane P.S.

   a. Sewer - 21” at 0.7% Min. Grade

   b. Capacity - 8.6 MGD Full
   7.2 MGD 0.7 Full

   c. Present Condition - 0.7 MGD Average
   2.6 MGD Peak

   d. Projected Sewage Flow for the Planning Period
   1.7 MGD Average
   5.1 MGD Peak

   Projected Sewage Flow for the Study Period
   2.0 MGD Average
   5.9 MGD Peak

   e. Line is adequate for the Planning Period.

   f. Line is adequate for the Study Period

---

2. From Thompson Lane P.S. to U.S. 231

   a. Sewer - 18” at 0.2% Min. Grade

   b. Capacity - 3.0 MGD Full
   2.5 MGD 0.7 Full

   c. Present Condition - 0.7 MGD Average
   2.6 MGD Peak

   d. Projected Sewage Flow for the Planning Period
   1.7 MGD Average
   5.1 MGD Peak

   Projected Sewage Flow for the Study Period
   2.0 MGD Average
   5.9 MGD Peak

   e. A parallel 21” line or replacement with a 27” line will be required during the Study Period.

   f. The modifications above will be adequate for the Planning Period.

---

3. PS V7 to PS C Force Main

a. Sewer - 18” at 0.20% Min. Grade

b. Capacity - 3.0 MGD Full
2.5 MGD 0.7 Full

c. Present Condition - 0.2 MGD Average
0.5 MGD Peak

d. Projected Sewage Flow for the Planning Period
0.7 MGD Average
2.2 MGD Peak

Projected Sewage Flow for the Study Period
0.9 MGD Average
2.7 MGD Peak

e. Line will be adequate for the Planning Period.

f. Line will be adequate for the Study Period.

---

4. PS C to PC B Force Main

a. Sewer - 15” at 0.40% Min. Grade

b. Capacity - 2.6 MGD Full
2.2 MGD 0.7 Full

c. Projected Sewage Flow for the Planning Period
0.3 MGD Average
1.1 MGD Peak

Projected Sewage Flow for the Study Period
0.5 MGD Average
1.7 MGD Peak

d. Line is adequate for the Planning Period.

e. Line is adequate for the Study Period.

---

5. PS B to PS A Force Main

a. Sewer - 12” at 1.04% Min. Grade

b. Capacity - 2.4 MGD Full
2.0 MGD Peak

c. Present Condition - 0.1 MGD Average
0.4 MGD Peak

d. Projected Sewage Flow for the Planning Period
0.5 MGD Average
1.5 MGD Peak

Projected Sewage Flow for the Study Period
0.6 MGD Average
1.9 MGD Peak

e. Line is adequate for the Planning Period

f. Line is adequate for the Study Period.

ANALYSIS OF CAPACITY
BUSHMAN CREEK INTERCEPTOR

1. Sinking Creek Interceptor to U. S. 231

   a. Sewer - 18” at 0.26% Min. Grade

   b. Capacity - 3.5 MGD Full
   2.9 MGD 0.7 Full

   c. Present Condition - 1.9 MGD Average
   5.6 MGD Peak

   d. Projected Sewage Flow for the Planning Period
   3.2 MGD Average
   9.7 MGD Peak

   Projected Sewage Flow for the Study Period
   3.9 MGD Average
   11.6 MGD Peak

   e. A parallel 27” line will be required during the Study Period.

   f. The modification will be adequate for the Study Period.

---

2. U. S. 231 to N.E. Interceptor

   a. Sewer - 18” at 0.24% Min. Grade

   b. Capacity - 3.3 MGD Full
   2.8 MGD 0.7 Full

   c. Present Condition - 1.0 MGD Average
   3.0 MGD Peak

   d. Projected Sewage Flow for the Planning Period
   2.1 MGD Average
   6.4 MGD Peak

   Projected Sewage Flow for the Study Period
   2.7 MGD Average
   8.0 MGD Peak

   e. A parallel 24” line will be required during the Study Period.

   f. The above modification will be adequate for the Study Period.

---

3. Above N.E. Interceptor

   a. Sewer - 15” at 0.6% Min. Grade

   b. Capacity - 3.2 MGD Full
      2.7 MGD 0.7 Full

   c. Present Condition - 0.2 MGD Average
      0.7 MGD Peak

   d. Projected Sewage Flow for the Planning Period
      1.0 MGD Average
      3.0 MGD Peak

      Projected Sewage Flow for the Study Period
      1.3 MGD Average
      3.9 MGD Peak

   e. Line is adequate for the Planning Period.

   f. Line may be overloaded near end of the Study Period.

ANALYSIS OF CAPACITY
NORTHEAST INTERCEPTOR

1. Bushman Creek Interceptor to Northfield Blvd.

   a. Sewer - 18” at 0.18% Min. Grade

   b. Capacity - 2.9 MGD Full
      2.4 MGD 0.7 Full

   c. Present Condition - 0.8 MGD Average
      2.3 MGD Peak

   d. Projected Sewage Flow for the Planning Period
      1.1 MGD Average
      3.4 MGD Peak

      Projected Sewage Flow for the Study Period
      1.4 MGD Average
      4.1 MGD Peak

   e. Line may reach capacity at end of the Planning Period.

   f. Line may be overloaded during Study Period.

---

2. Above Northfield Blvd.

   a. Sewer - 12” at 22% Min. Grade

   b. Capacity - 1.1 MGD Full
      0.9 MGD 0.7 Full

   c. Present Condition - 0.7 MGD Average
      2.0 MGD Peak

   d. Projected Sewage Flow for the Planning Period
      1.0 MGD Average
      3.0 MGD Peak

      Projected Sewage Flow for the Study Period
      1.2 MGD Average
      3.6 MGD Peak

   e. A parallel 18” line will be required during the Study Period.

   f. The above modifications will be adequate for the Planning Period.

ANALYSIS OF CAPACITY
STONES RIVER INTERCEPTOR

1. Plant to Old Broad Street Plant Site
(Nashville Highway between Northfield & Battleground)

   a. Sewer - 42” at 0.1% Min. Grade

   b. Capacity - 20.6 MGD Full
   17.3 MGD 0.7 Full

   c. Present Condition - 5.8 MGD Average
   17.3 MGD Peak

   d. Projected Sewage Flow for the Planning Period
   13.0 MGD Average
   39.0 MGD Peak

   Projected Sewage Flow for the Study Period
   23.9 MGD Average
   71.7 MGD Peak

   e. Line is adequate for projected flow for the Planning Period.

   f. Line may reach capacity at the end of the Study Period.

---

2. Old Broad Street Plant Site to Ridgely Road

   a. Sewer - Two parallel interceptors that include one (1) 21” at 0.07% min. grade and the Stones River Interceptor Extension which is a 42” at 0.10% min. grade reducing upstream to a 36” at 0.14% min. grade.

   b. Capacity - 21” - 2.7 MGD Full
   2.3 MGD 0.7 Full

   36” - 16.2 MGD Full
   13.5 MGD 0.7 Full

   42” - 20.6 MGD Full
   17.3 MGD 0.7 Full

   Therefore, the min. capacity is found where the 21” and 36” lines are parallel.

   Capacity = 2.7 + 16.2 = 18.9 MGD Full
   2.3 + 13.5 = 15.8 MGD 0.7 Full

   c. Present Condition - 5.6 MGD Average

16.7 MGD Peak

d. Projected Sewage Flow for the Planning Period

12.7 MGD Average
38.2 MGD Peak

Projected Sewage Flow for the Study Period

23.4 MGD Average
70.2 MGD Peak

e. Lines are adequate for projected floe for the Planning Period.

f. Lines may reach capacity at the end of the Study Period.

ANALYSIS OF CAPACITY
LOWER LYTLE CREEK INTERCEPTOR

1. Ridgely Road to Main and Broad Streets

   a. Sewer - 30” at 0.06% Min. Grade

   b. Capacity - 6.5 MGD Full
   5.5 MGD 0.7 Full

   c. Present Condition - 2.1 MGD Average
   6.4 MGD Peak

   d. Projected Sewage Flow for the Planning Period
   5.0 MGD Average
   15.1 MGD Peak

   Projected Sewage Flow for the Study Period
   9.9 MGD Average
   29.6 MGD Peak

   e. Construction of a parallel 48” line will be required during the Study Period.

   f. These two parallel lines will be adequate for the projected flow during the Study Period.

---

2. Main and Broad Streets to Church Street

   a. Sewer - 30” at 0.06% Min. Grade

   b. Capacity - 6.5 MGD Full
   5.5 MGD 0.7 Full

   c. Present Condition - 2.1 MGD Average
   6.3 MGD Peak

   d. Projected Sewage Flow for the Planning Period
   4.9 MGD Average
   14.7 MGD Peak

   Projected Sewage Flow for the Study Period
   9.7 MGD Average
   29.2 MGD Peak

   e. Line is adequate for projected flow during the Planning Period.

   f. Line will be overloaded at end of the Study Period.

ANALYSIS OF CAPACITY
UPPER LYTLE CREEK INTERCEPTOR

1. Church and Broad to Church and Rushwood

   a. Sewer - 15” at Min. Grade

   b. Capacity - 1.6 MGD Full
   1.4 MGD 0.7 Full

   c. Present Condition - 0.8 MGD Average
   2.4 MGD Peak

   d. Projected Sewage Flow for the Planning Period
   3.3 MGD Average
   9.8 MGD Peak

   Projected Sewage Flow for the Study Period
   7.9 MGD Average
   23.8 MGD Peak

   e. Requires a parallel 48” line or replacement with a 54” line during the Planning Period.

   f. The above modification will be adequate for the Study Period.

---

2. Church and Rushwood to Sanbyrn Drive

   a. Sewer - 12” at Min. Grade

   b. Capacity - 1.1 MGD Full
   0.9 MGD 0.7 Full

   c. Present Condition - 0.8 MGD Average
   2.3 MGD Peak

   d. Projected Sewage Flow for the Planning Period
   3.2 MGD Average
   9.7 MGD Peak

   Projected Sewage Flow for the Study Period
   7.9 MGD Average
   23.6 MGD Peak

   e. Requires a parallel 48” line or replacement with a 54” line during the Planning Period.

f. The above modification will be adequate for the Study Period.

---

3. Above Sanbyrn Drive

a. Sewer - 21” at 0.10%

b. Capacity - 3.2 MGD Full
2.7 MGD 0.7 Full

c. Present Condition - 0.8 MGD Average
2.3 MGD Peak

d. Projected Sewage Flow for the Planning Period
3.1 MGD Average
9.3 MGD Peak

Projected Sewage Flow for the Study Period
7.6 MGD Average
22.9 MGD Peak

e. Line is adequate for the Planning Period.

f. Line may be overloaded during the Study Period.

ANALYSIS OF CAPACITY
BRADYVILLE ROAD INTERCEPTOR

1. Church Street to Manchester Pike

   a. Sewer - 24” at 0.10% Min. Grade or 18” at 0.75% Min. Grade

   b. Capacity - 24” at 0.10% - 4.6 MGD Full
   3.9 MGD 0.7 Full

   18” at 0.75% - 5.9 MGD Full
   4.9 MGD 0.7 Full

   c. Present Condition - 1.3 MGD Average
   3.8 MGD Peak

   d. Projected Sewage Flow for the Planning Period
   1.6 MGD Average
   4.7 MGD Peak

   Projected Sewage Flow for the Study Period
   1.7 MGD Average
   5.2 MGD Peak

   e. Line is adequate for the Planning Period.

   f. Line is adequate for the Study Period.

---

2. Manchester Pike to Bradyville Road Diversion Station

   a. Sewer - 18” at 0.12% Min. Grade

   b. Capacity - 2.4 MGD Full
   2.0 MGD 0.7 Full

   c. Present Condition - 0.9 MGD Average
   2.7 MGD Peak

   d. Projected Sewage Flow for the Planning Period
   1.1 MGD Average
   3.2 MGD Peak

   Projected Sewage Flow for the Study Period
   1.1 MGD Average
   3.3 MGD Peak

e. Line will reach capacity at the end of the Planning Period.

f. Line will be overloaded during Study Period.

---

3. Bradyville Road Diversion Station to Minerva Drive

a. Sewer - 18” at 0.16% Min. Grade

b. Capacity - 2.7 MGD Full
2.3 MGD 0.7 Full

c. Present Condition - 0.2 MGD Average
0.6 MGD Peak

d. Projected Sewage Flow for the Planning Period
0.3 MGD Average
0.8 MGD Peak

Projected Sewage Flow for the Study Period
0.4 MGD Average
1.0 MGD Peak

e. Line is adequate for projected flow during the Planning Period.

f. Line may be overloaded during the Study Period.

ANALYSIS OF CAPACITY
SOUTHWEST INTERCEPTOR

1. Ridgely Road to Screw Lift Pump Station

   a. Sewer - 21" at 0.29% Min. Grade
      30" at 0.16% Min. Grade

   b. Capacity 21" - 5.5 MGD Full
      4.6 MGD 0.7 Full
      30" - 10.6 MGD Full
      8.9 MGD 0.7 Full
      TOTAL 16.1 MGD Full
      13.5 MGD 0.7 Full

   c. Present Condition - 2.1 MGD Average
      6.2 MGD Peak

   d. Projected Sewage Flow for the Planning Period
      5.8 MGD Average
      17.3 MGD Peak

      Projected Sewage Flow for the Study Period
      11.2 MGD Average
      33.5 MGD Peak

   e. Lines are adequate for the Planning Period.

   f. Lines are adequate for the Study Period.

---

2. Screw Lift Pump Station to Malloy Lane

   a. Sewer - 21" at 0.2% Min. Grade

   b. Capacity - 4.6 MGD Full
      3.8 MGD 0.7 Full

   c. Present Condition - 2.1 MGD Average
      6.2 MGD Peak

   d. Projected Sewage Flow for the Planning Period
      5.7 MGD Average
      17.1 MGD Peak

      Projected Sewage Flow for the Study Period
      11.1 MGD Average
      32.2 MGD Peak

e. Requires a parallel 42” line or replacement with a 48” line.

f. The above modifications will be adequate for the Study Period.

---

3. Malloy Lane to End of Line above I-24

a. Sewer - 21” at 0.1% Min. Grade

b. Capacity - 3.2 MGD Full
2.7 MGD 0.7 Full

c. Present Condition - 1.9 MGD Average
5.6 MGD Peak

d. Projected Sewage Flow for the Planning Period
5.1 MGD Average
15.4 MGD Peak

Projected Sewage Flow for the Study Period
10.2 MGD Average
30.7 MGD Peak

e. Requires parallel 42” line or replacement with a 48” line during the Planning Period.

f. The above modifications will be adequate for the Study Period.

---

4. I-24 to State Route 99

a. Sewer - 18” at 0.12% Min. Grade

b. Capacity - 2.4 MGD Full
2.0 MGD 0.7 Full

c. Present Condition - 0.9 MGD Average
2.7 MGD Peak

d. Projected Sewer Flow for Planning Period
3.6 MGD Average
10.8 MGD Peak

Projected Sewer Flow for Study Period
7.5 MGD Average
22.6 MGD Peak

e. Requires a parallel 36” line during the Planning Period.

f. The above modification will be adequate during the Study Period.

---

5. State Route 99 to PS R8 Force Main

   a. Sewer - 18” at 0.12% Min. Grade

   b. Capacity - 2.4 MGD Full
      2.0 MGD 0.7 Full

   c. Present Condition - 0.9 MGD Average
      2.7 MGD Peak

   d. Projected Sewage Flow for the Planning Period
      3.6 MGD Average
      10.8 MGD Peak

      Projected Sewage Flow for the Study Period
      7.5 MGD Average
      22.6 MGD Peak

   e. Requires a parallel 36” line or replacement with a 30” line.

   f. The above modification will be adequate for the Study Period.

---

6. Pumping Station R8 to River Crossing

   a. Sewer - 18” at 0.30% Min. Grade

   b. Capacity - 3.7 MGD Full
      3.1 MGD 0.7 Full

   c. Present Condition - 0.8 MGD Average
      2.2 MGD Peak

   d. Projected Sewage Flow for the Planning Period
      3.3 MGD Average
      9.8 MGD Peak

      Projected Sewage Flow for the Study Period
      7.2 MGD Average
      21.5 MGD Peak

   e. Existing line is adequate for the Planning Period.

   f. Existing line will be overloaded toward the end of the Study Period.

---

7. River Crossing to Hwy 231

a. Sewer - 12” at 0.22% Min. Grade

b. Capacity - 1.1 MGD Full
0.9 MGD 0.7 Full

c. Present Condition - 0.8 MGD Average
2.2 MGD Peak

d. Projected Sewage Flow for the Planning Period
2.3 MGD Average
9.8 MGD Peak

Projected Sewage Flow for the Study Period
7.2 MGD Average
21.5 MGD Peak

e. Requires a parallel 30” line during the Planning Period.

f. The above modification will be adequate for the Study Period.

---

8. Hwy 231 to End of Existing Line

a. Sewer - 12” at 0.22% Min. Grade

b. Capacity - 1.1 MGD Full
0.9 MGD 0.7 Full

c. Present Condition - 0.7 MGD Average
2.1 MGD Peak

d. Projected Sewage Flow for the Planning Period
3.0 MGD Average
9.0 MGD Peak

Projected Sewage Flow for the Study Period
7.0 MGD Average
21.0 MGD Peak

e. Requires a parallel 30” line during the Planning Period.

f. The above modification will be adequate for the Study Period.

ANALYSIS OF CAPACITY
SAMSONITE RELIEF SEWER

1. From Southwest Interceptor to Midpoint of Malloy Lane

   a. Sewer - 21" at 0.16% Min. Grade

   b. Capacity - 4.0 MGD Full
   3.4 MGD 0.7 Full

   c. Present Condition - 0.2 MGD Average
   0.6 MGD Peak

   d. Projected Sewage Flow for the Planning Period
   0.5 MGD Average
   1.5 MGD Peak

   Project Sewage Flow for the Study Period
   0.8 MGD Average
   2.3 MGD Peak

   e. Existing line is adequate for the Planning Period.

   f. Existing line is adequate for the Study Period.

---

2. From Midpoint of Malloy Lane to Samsonite Blvd. West of Rutledge Way

   a. Sewer - 21" - 0.10% Min. Grade

   b. Capacity - 3.2 MGD Full
   2.7 MGD 0.7 Full

   c. Present Condition - 0.1 MGD Average
   0.3 MGD Peak

   d. Projected Sewage Flow for the Planning Period
   0.4 MGD Average
   1.3 MGD Peak

   Projected Sewage Flow for the Study Period
   0.6 MGD Average
   1.8 MGD Peak

   e. Existing line is adequate for the Planning Period.

   f. Existing line is adequate for the Study Period.

---

3. Above Samsonite Blvd.

   a. Sewer - 15” at 0.16% Min. Grade

   b. Capacity - 1.7 MGD Full
      1.4 MGD 0.7 Full

   c. Present Condition - 0.1 MGD Average
      0.3 MGD Peak

   d. Projected Sewage Flow for the Planning Period
      0.4 MGD Average
      1.1 MGD Peak

      Projected Sewage Flow for the Study Period
      0.5 MGD Average
      1.5 MGD Peak

   e. Existing line is adequate for the Planning Period

   f. Existing line is adequate for the Study Period.

ANALYSIS OF CAPACITY
OVERALL CREEK SEWER

1 From Overall Creek Pump Station to below Asbury Rd.

a. Sewer - 36" at 0.07% Minimum Grade

b. Capacity - 16.47 MGD Full
13.79 MGD 0.7 Full

c. Present Condition - 0.14 MGD Average
0.41 MGD Peak

d. Projected Sewage Flow for the Planning Period

5.7 MGD Average
17.3 MGD Peak

Projected Sewage Flow for the Study Period

12.6 MGD Average
37.9 MGD Peak

e. Line may become overloaded near end of Planning Period

f. Requires parallel 48” for Study Period

2 From below Asbury Rd. to below Mason Pk.

a. Sewer 24" at 0.13% Minimum Grade

b. Capacity - 7.61 MGD Full
6.38 MGD 0.7 Full

c. Present Condition - 0.08 MGD Average
0.25 MGD Peak

d. Projected Sewage Flow for the Planning Period

4.9 MGD Average
14.6 MGD Peak

Projected Sewage Flow for the Study Period

11.0 MGD Average
33.1 MGD Peak

e. Line may become overloaded near end of Planning Period

f. Requires a parallel 48” for Study Period

3 From below Mason Pike to Puckett Creek Interceptor

a. Sewer 21" at 0.15% Minimum Grade

b. Capacity - 5.73 MGD Full
4.80 MGD 0.7 Full

c. Current Conditions - 0.07 MGD Average
0.20 MGD Peak

d. Projected Sewage Flow for the Planning Period

4.9 MGD Average
14.8 MGD Peak

Projected Sewage Flow for the Study Period

11.0 MGD Average
33.1 MGD Peak

e. Line may become overloaded neare end of Planning Period

f. Requires a parallel 48” for Study Period

4 From joint at Puckett Creek Interceptor to Highway 96

a. Sewer 18" at 0.18% Minimum Grade

b. Capacity - 4.16 MGD Full
3.48 MGD 0.7 Full

c. Current Condition - 0.05 MGD Average
0.16 MGD Peak

d. Projected Sewage Flow for the Planning Period

3.5 MGD Average
10.5 MGD Peak

Projected Sewage Flow for the Study Period

7.9 MGD Average
23.8 MGD Peak

e. Line may become overloaded near end of Planning Period

f. Requires a parallel 36” for Study Period

5 From Highway 96 to Windrow Road

a. Sewer 15" at 0.19% Minimum Grade

b. Capacity - 2.63 MGD Full
2.20 MGD 0.7 Full

c. Current Condition - 0.05 MGD Average
0.16 MGD Peak

d. Projected Sewage Flow for the Planning Period

1.2 MGD Average
3.6 MGD Peak

Projected Sewage Flow for the Study Period

2.2 MGD Average
6.5 MGD Peak

e. Line may become overloaded near end of Planning Period

f. Requires a parallel 21” for Study Period

ANALYSIS OF CAPACITY
PUCKETT CREEK SEWER

1 Above Highway 96

a. Sewer 21" at 0.28 Minimum Grade

b. Capacity - 7.88 MGD Full
6.55 MGD 0.7 Full

c. Current Condition - 0.02 MGD Average
0.06 MGD Peak

d. Projected Sewage Flow for the Planning Period

1.6 MGD Average
4.9 MGD Peak

Projected Sewage Flow for the Study Period

3.6 MGD Average
10.9 MGD Peak

e. Line is adequate for the Planning Period

f. Line may become overloaded within the Study Period

2 Highway 96 Crossing

a. Sewer 20" at 0.28% Minimum Grade

b. Capacity - 6.87 MGD Full
5.75 MGD 0.7 Full

c. Current Condition - 0.02 MGD Average
0.06 MGD Peak

d. Projected Sewage Flow for the Planning Period

1.6 MGD Average
4.9 MGD Peak

Projected Sewage Flow for the Study Period

3.6 MGD Average
10.9 MGD Peak

e. Line is adequate for the Planning Period

f. Line may become overloaded within the Study Period

3 From below Highway 96 to Highway 99

a. Sewer 18" at 0.16% Minimum Grade

b. Capacity - 3.92 MGD Full
3.28 MGD 0.7 Full

c. Current Condition - 0.02 MGD Average
0.06 MGD Peak

d. Projected Sewage Flow for the Planning Period

1.3 MGD Average
3.9 MGD Peak

Projected Sewage Flow for the Study Period

3.1 MGD Average
9.3 MGD Peak

e. Line is adequate for the Planning Period

f. Line may become overloaded within the Study Period

ANALYSIS OF CAPACITY
BLACKMAN STUB SEWER

1 From joint at Overall Creek Interceptor

a. Sewer 10" at 0.28% Minimum Grade

b. Capacity - 1.08 MGD Full
0.91 MGD 0.7 Full

c. Current Condition - 0.0 MGD Average
0.0 MGD Peak

d. Projected Sewage Flow for the Planning Period

0.3 MGD Average
0.9 MGD Peak

Projected Sewage Flow for the Study Period

1.0 MGD Average
3.1 MGD Peak

e. Line is adequate for the Planning Period

f. Line may become overloaded within the Study Period

2 East of Brinkley Rd.

a. Sewer 15" at 0.28% Minimum Grade

b. Capacity - 3.19 MGD Full
2.67 MGD 0.7 Full

c. Current Condition - 0.0 MGD Average
0.0 MGD Peak

d. Projected Sewage Flow for the Planning Period

0.2 MGD Average
0.6 MGD Peak

Projected Sewage Flow for the Study Period

0.8 MGD Average
2.4 MGD Peak

e. Line is adequate for the Planning Period

f. Line may become overloaded within the Study Period

3 Brinkley Rd. Crossing

a. Sewer 16" at 0.28% Minimum Grade

b. Capacity - 3.79 MGD Full
2.67 MGD 0.7 Full

c. Current Condition - 0.0 MGD Average
0.0 MGD Peak

d. Projected Sewage Flow for the Planning Period

0.2 MGD Average
0.6 MGD Peak

Projected Sewage Flow for the Study Period

0.8 MGD Average
2.4 MGD Peak

e. Line is adequate for the Planning Period

f. Line may become overloaded within the Study Period

4 From West of Brinkley Road to Blackman Rd. (I-840)

a. Sewer 15" at 0.28% Minimum Grade

b. Capacity - 3.19 MGD Full
2.67 MGD 0.7 Full

c. Current Condition - 0.0 MGD Average
0.0 MGD Peak

d. Projected Sewage Flow for the Planning Period

0.2 MGD Average
0.6 MGD Peak

Projected Sewage Flow for the Study Period

0.8 MGD Average
2.4 MGD Peak

e. Line is adequate for the Planning Period

f. Line may become overloaded within the Study Period

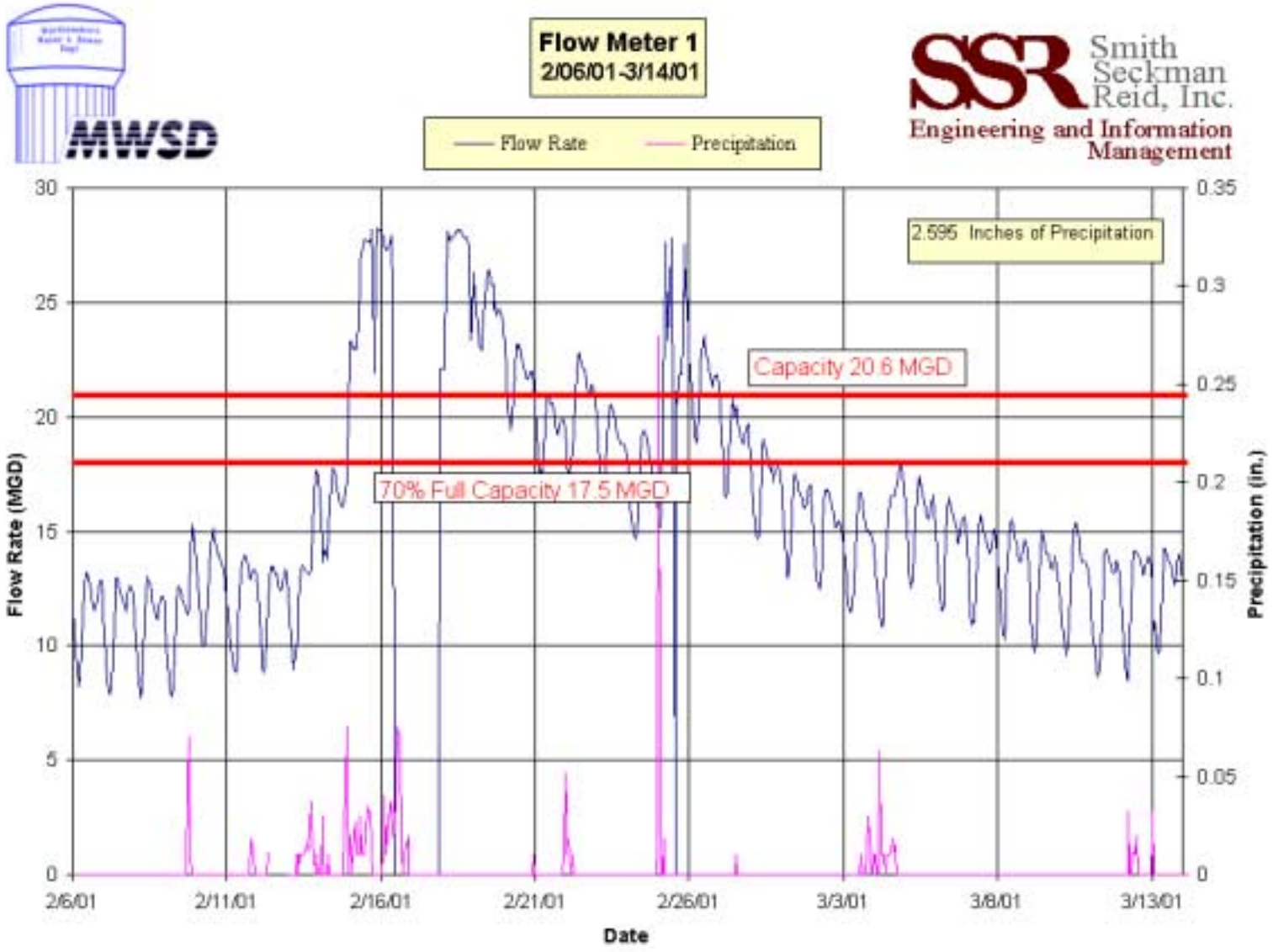
APPENDIX B

FLOWS AND DEPTHS AT MONITORING STATIONS THROUGHOUT COLLECTION SYSTEM

MWSD

Flow Meter 1
2/06/01-3/14/01

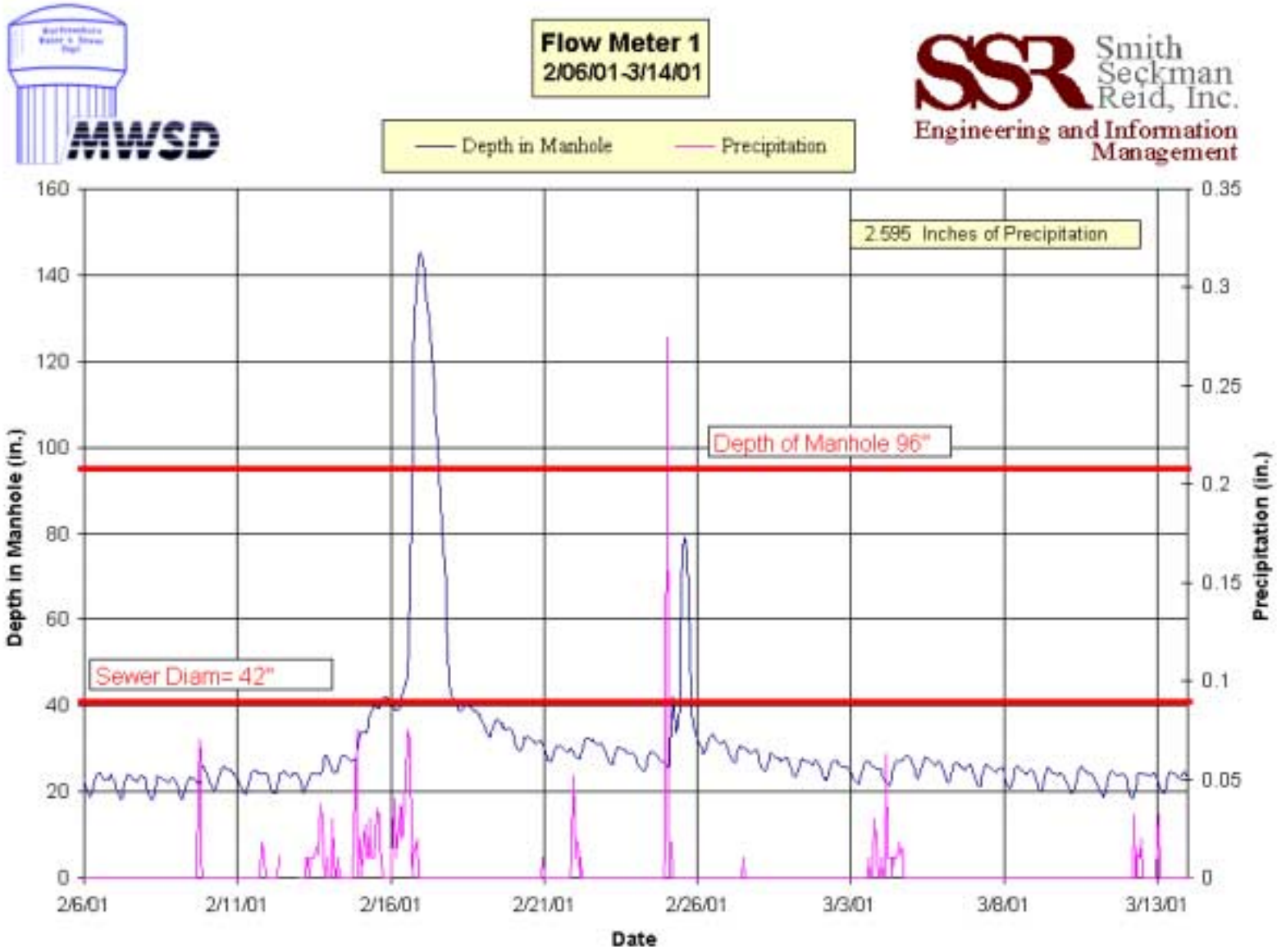
Smith Seckman Reid, Inc.
Engineering and Information Management

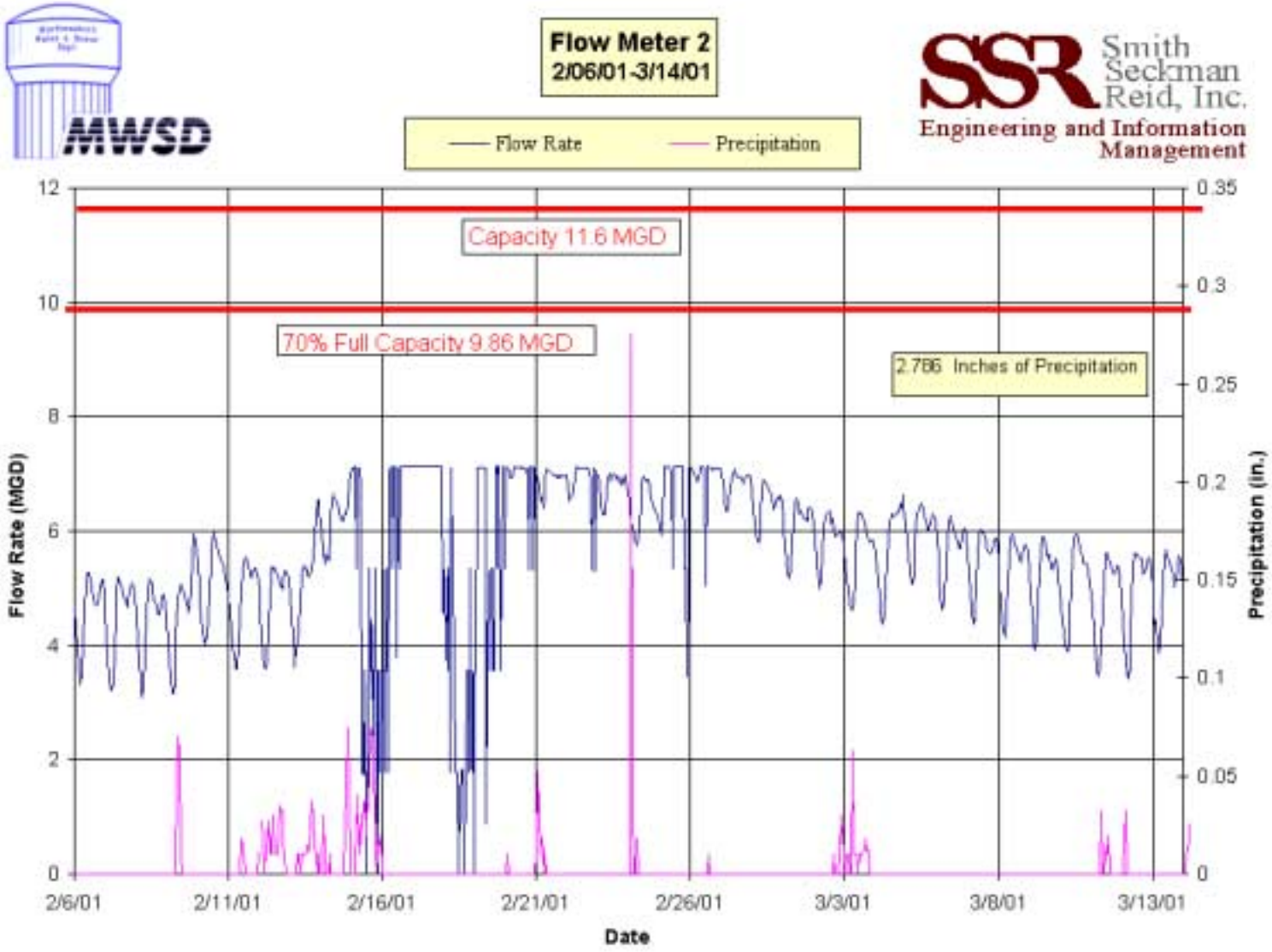


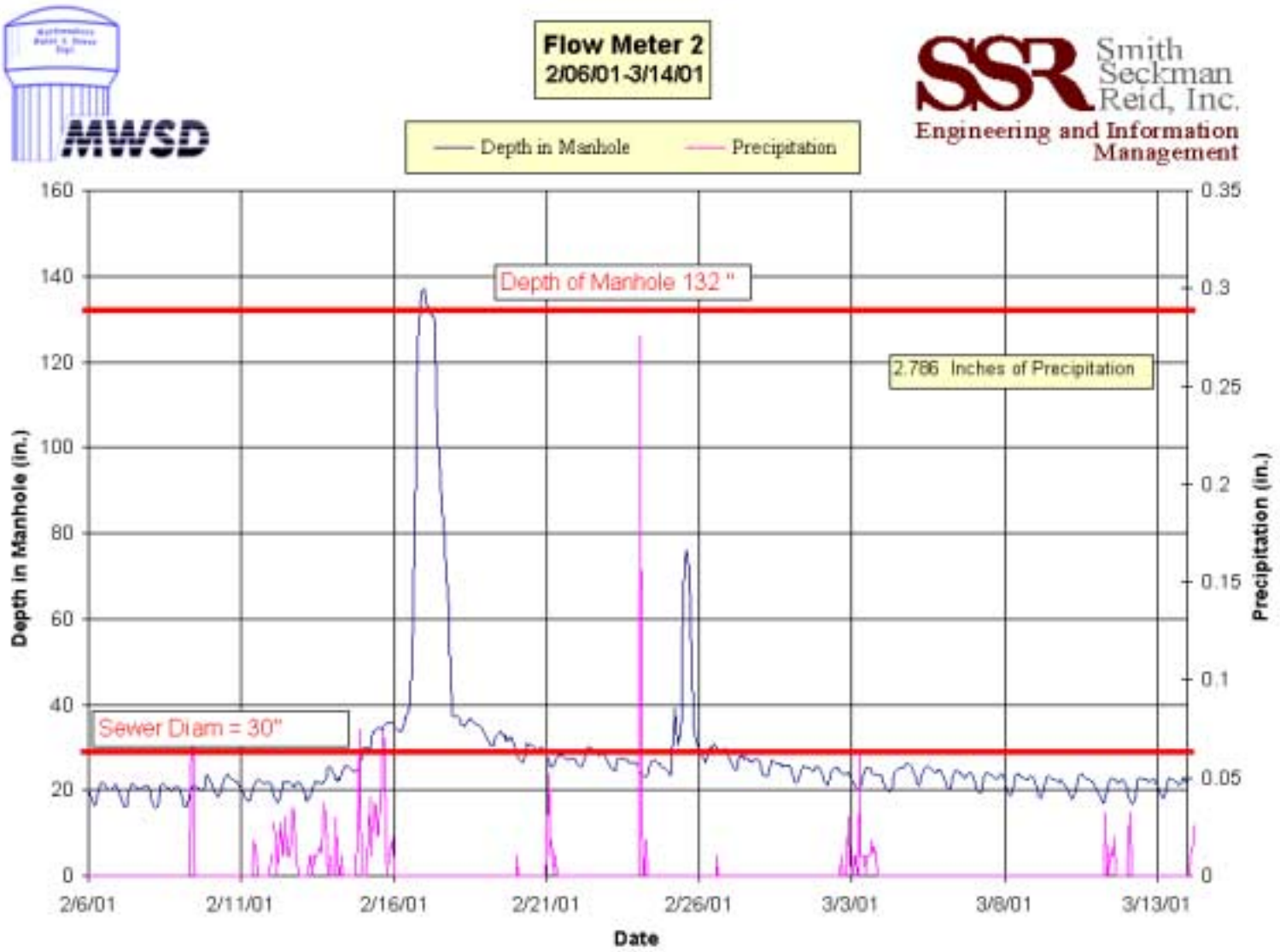
MWSD

Flow Meter 1
2/06/01-3/14/01

Smith Seckman Reid, Inc.
Engineering and Information Management




MWSD
Flow Meter 2
2/06/01-3/14/01
Smith Seckman Reid, Inc.
Engineering and Information Management
Flow Rate
Precipitation
Capacity 11.6 MGD
70% Full Capacity 9.86 MGD
2.786 Inches of Precipitation
Flow Rate (MGD)
Precipitation (in.)
Date
2/6/01
2/11/01
2/16/01
2/21/01
2/26/01
3/3/01
3/8/01
3/13/01
0
2
4
6
8
10
12
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35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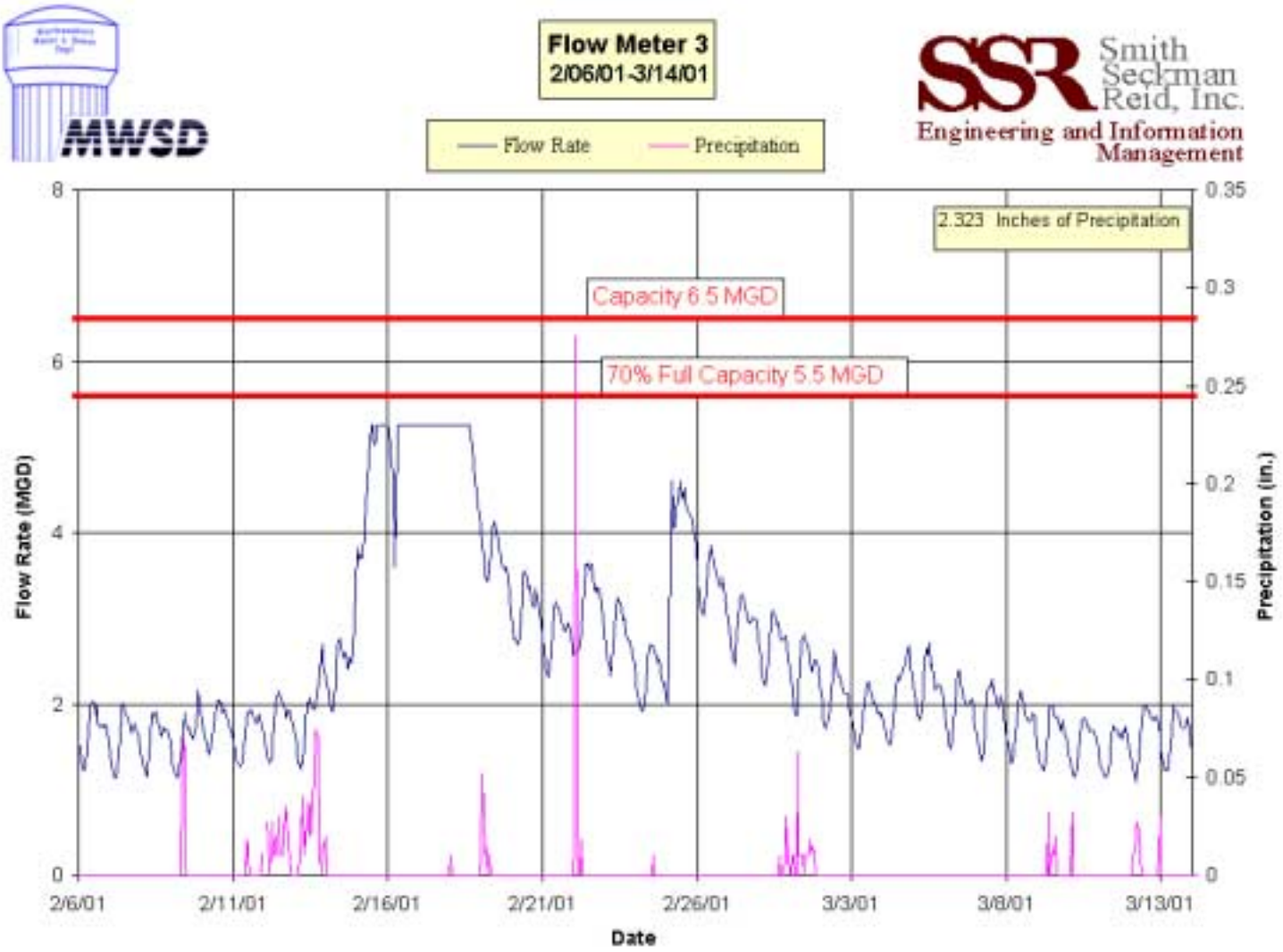
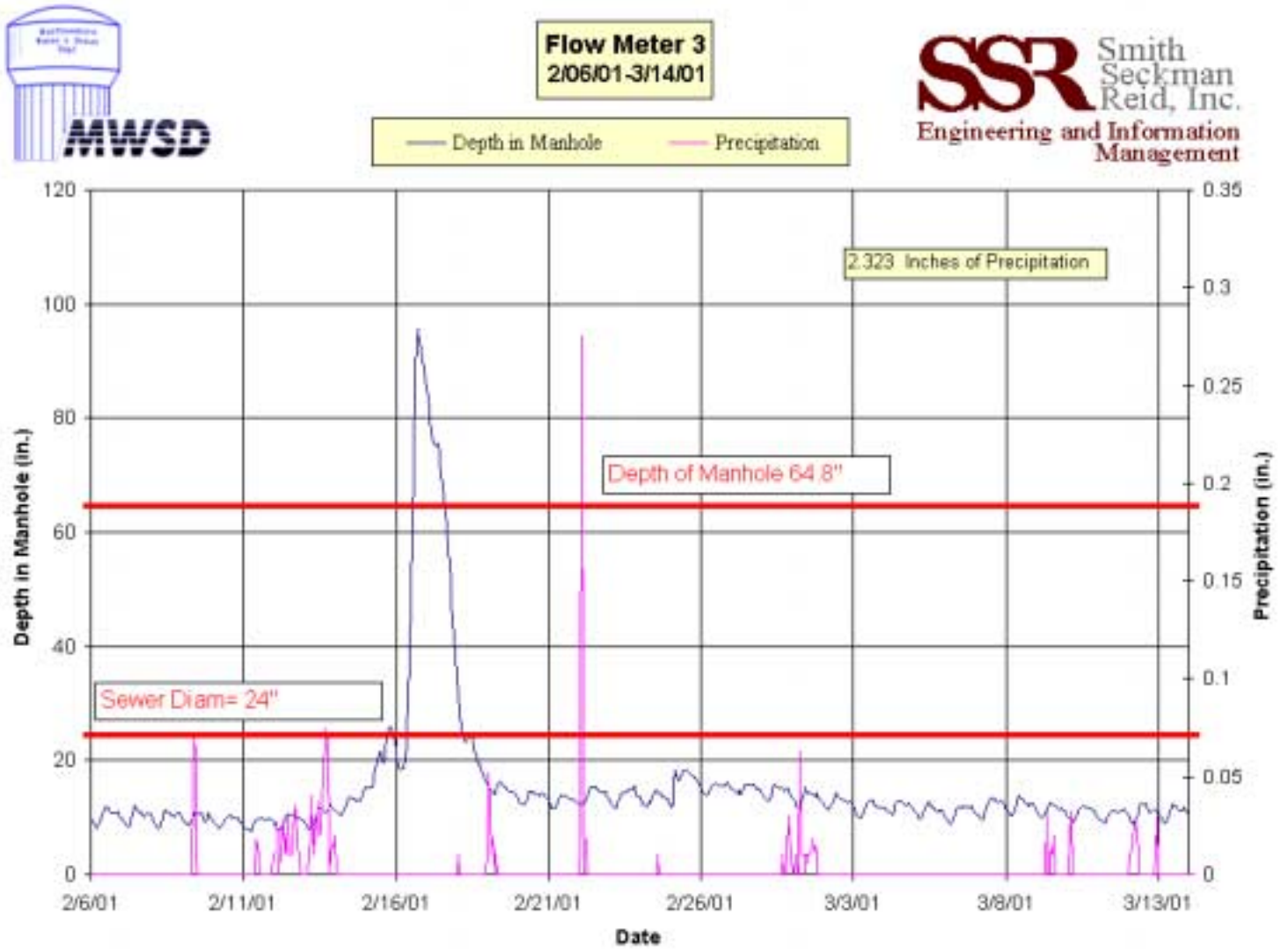
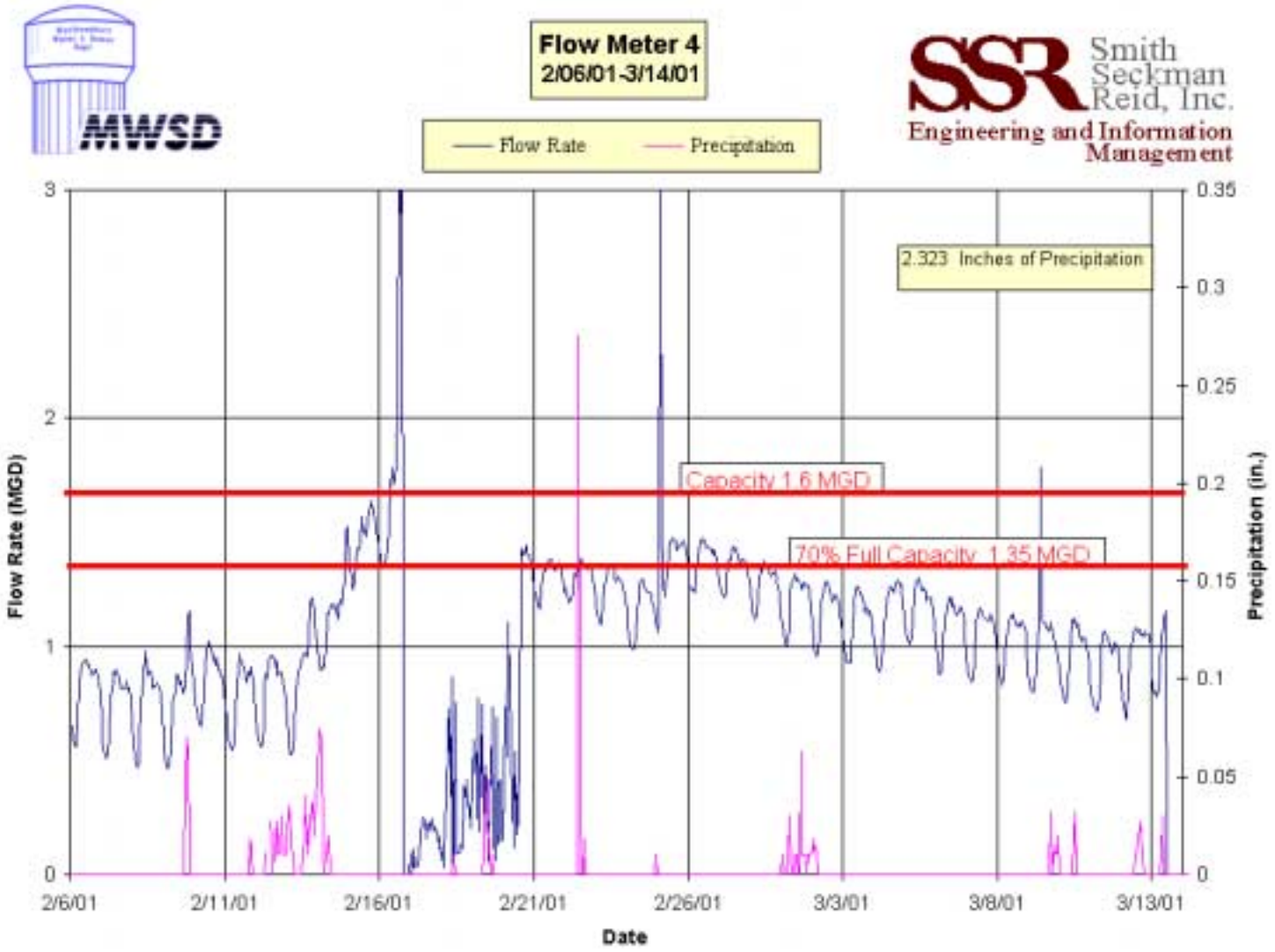
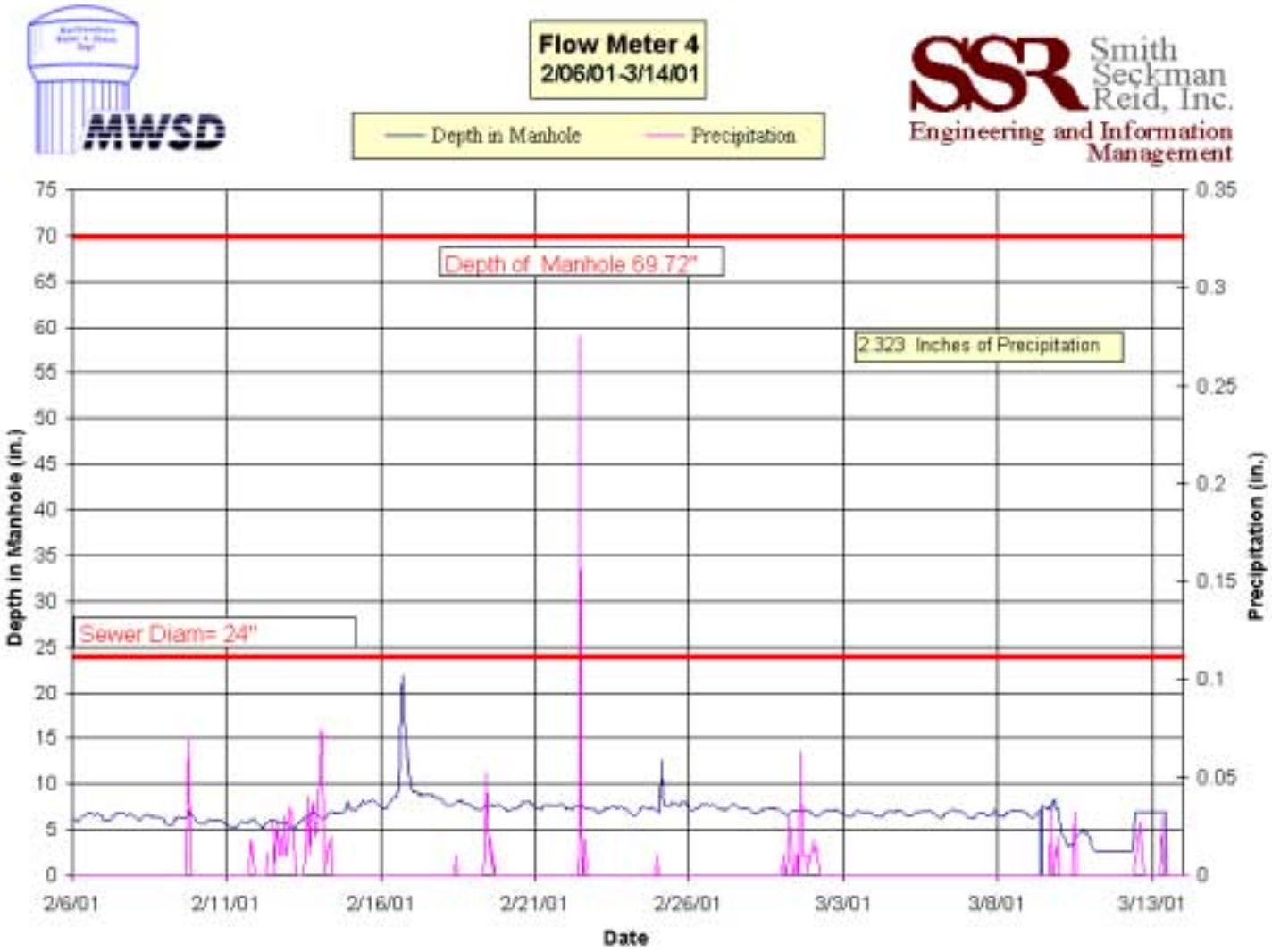
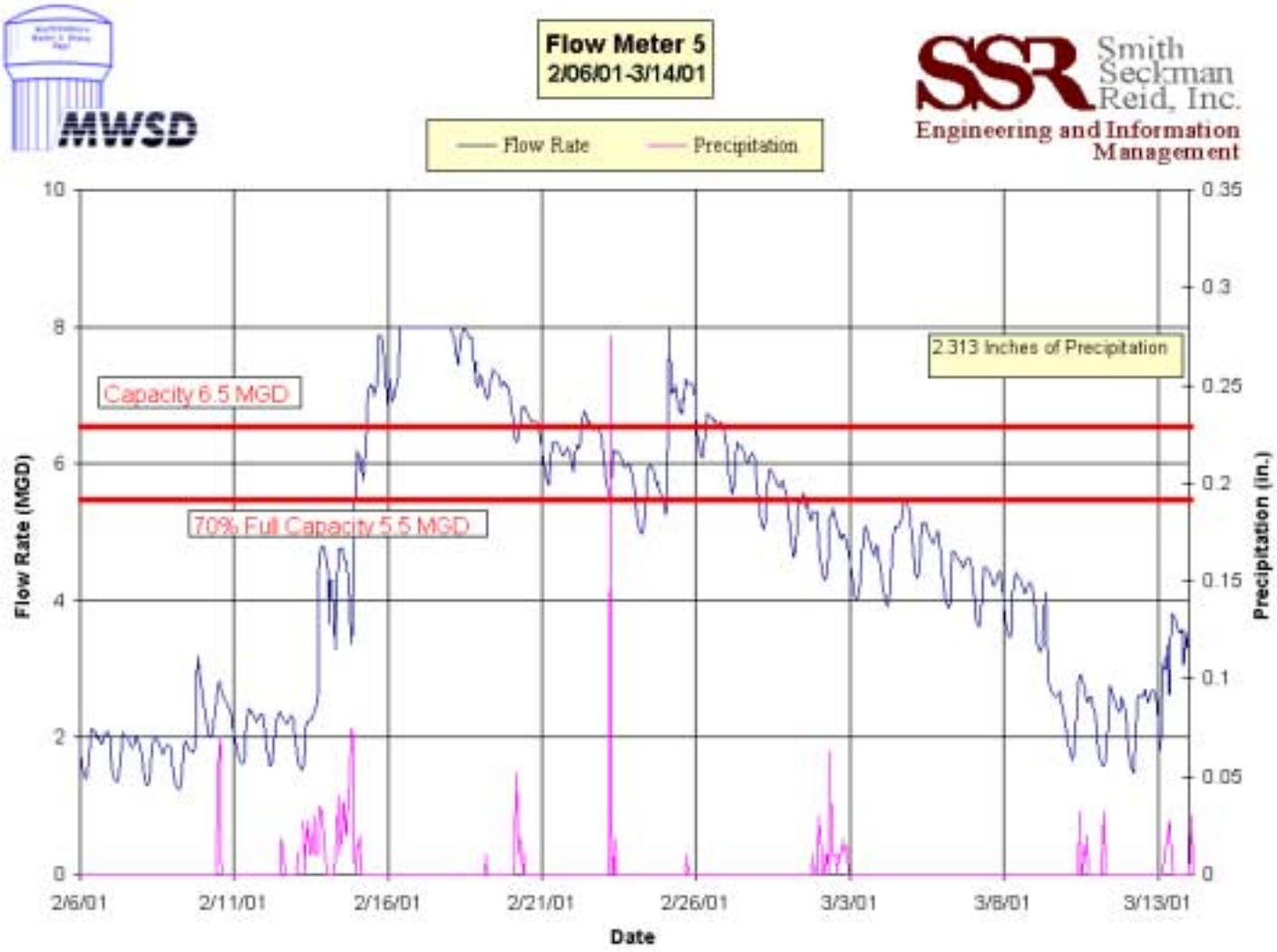
Flow Meter 2
2/06/01-3/14/01
Smith Seckman Reid, Inc.
Engineering and Information Management
Depth in Manhole
Precipitation
Depth of Manhole 132 "
2.786 Inches of Precipitation
Sewer Diam = 30"
Depth in Manhole (in.)
Precipitation (in.)
Date
160
140
120
100
80
60
40
20
0
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2/6/01
2/11/01
2/16/01
2/21/01
2/26/01
3/3/01
3/8/01
3/13/01


MWSD
Flow Meter 3
2/06/01-3/14/01
Flow Rate
Precipitation
SSR
Smith
Seckman
Reid, Inc.
Engineering and Information
Management
2.323 Inches of Precipitation
Capacity 6.5 MGD
70% Full Capacity 5.5 MGD
Flow Rate (MGD)
Precipitation (in.)
0
2
4
6
8
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
2/6/01
2/11/01
2/16/01
2/21/01
2/26/01
3/3/01
3/8/01
3/13/01
Date


MWSD
Flow Meter 3
2/06/01-3/14/01
Depth in Manhole
Precipitation
SSR
Smith
Seckman
Reid, Inc.
Engineering and Information
Management
2.323 Inches of Precipitation
Depth of Manhole 64.8"
Sewer Diam= 24"
Depth in Manhole (in.)
Precipitation (in.)
Date
120
100
80
60
40
20
0
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2/6/01
2/11/01
2/16/01
2/21/01
2/26/01
3/3/01
3/8/01
3/13/01


MWSD
Flow Meter 4
2/06/01-3/14/01
Smith Seckman Reid, Inc.
Engineering and Information Management
Flow Rate
Precipitation
2.323 Inches of Precipitation
Capacity 1.6 MGD
70% Full Capacity 1.35 MGD
Flow Rate (MGD)
Precipitation (in.)
Date
0
1
2
3
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
2/6/01
2/11/01
2/16/01
2/21/01
2/26/01
3/3/01
3/8/01
3/13/01

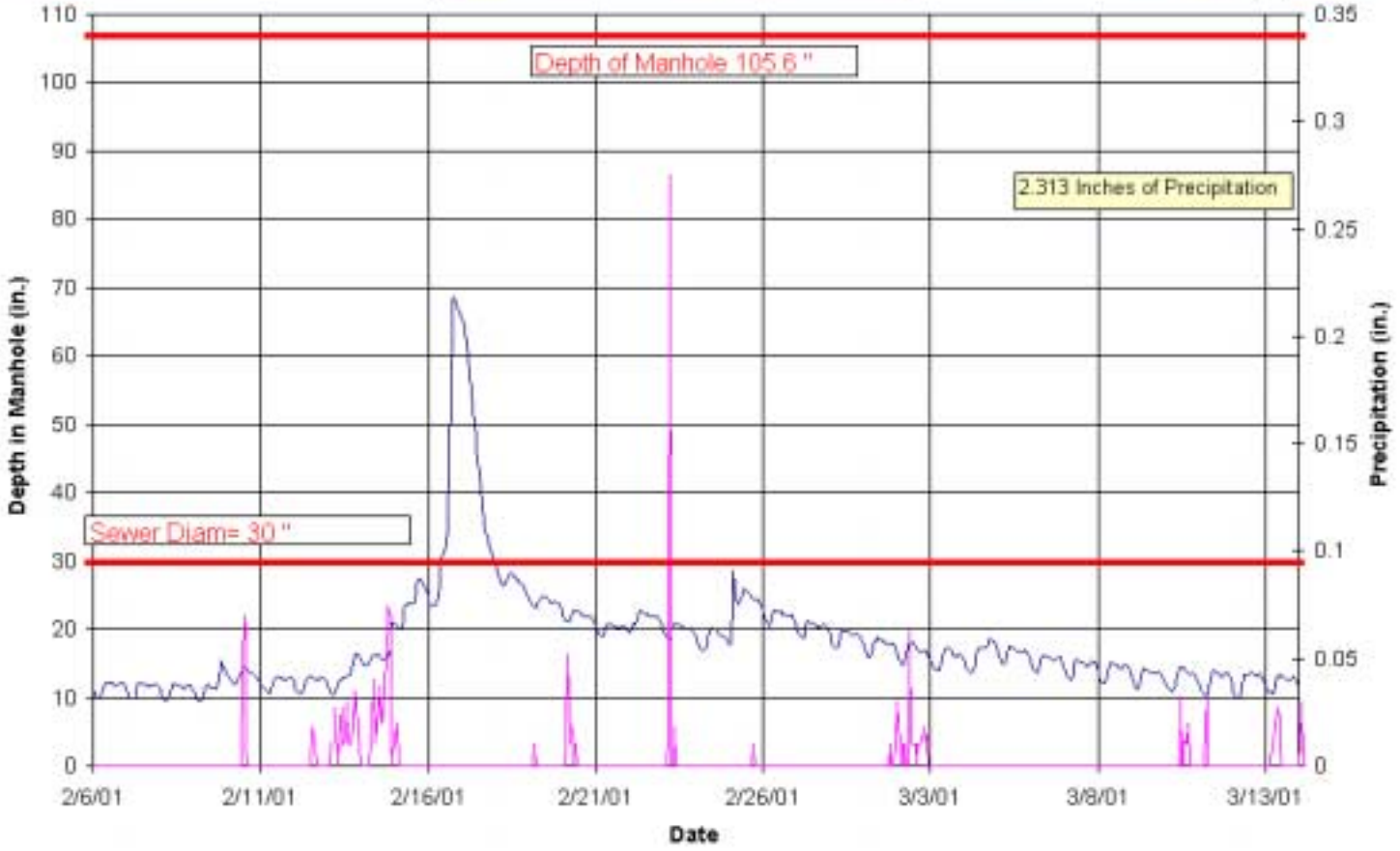

MWSD
Flow Meter 4
2/06/01-3/14/01
Depth in Manhole
Precipitation
SSR
Smith
Seckman
Reid, Inc.
Engineering and Information
Management
Depth of Manhole 69.72"
2.323 Inches of Precipitation
Sewer Diam= 24"
Depth in Manhole (in.)
Precipitation (in.)
Date
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2/6/01
2/11/01
2/16/01
2/21/01
2/26/01
3/3/01
3/8/01
3/13/01


MWSD
Flow Meter 5
2/06/01-3/14/01
Smith Seckman Reid, Inc.
Engineering and Information Management
Flow Rate
Precipitation
2.313 Inches of Precipitation
Capacity 6.5 MGD
70% Full Capacity 5.5 MGD
Flow Rate (MGD)
Precipitation (in.)
Date
2/6/01
2/11/01
2/16/01
2/21/01
2/26/01
3/3/01
3/8/01
3/13/01

MWSD

Flow Meter 5
2/06/01-3/14/01

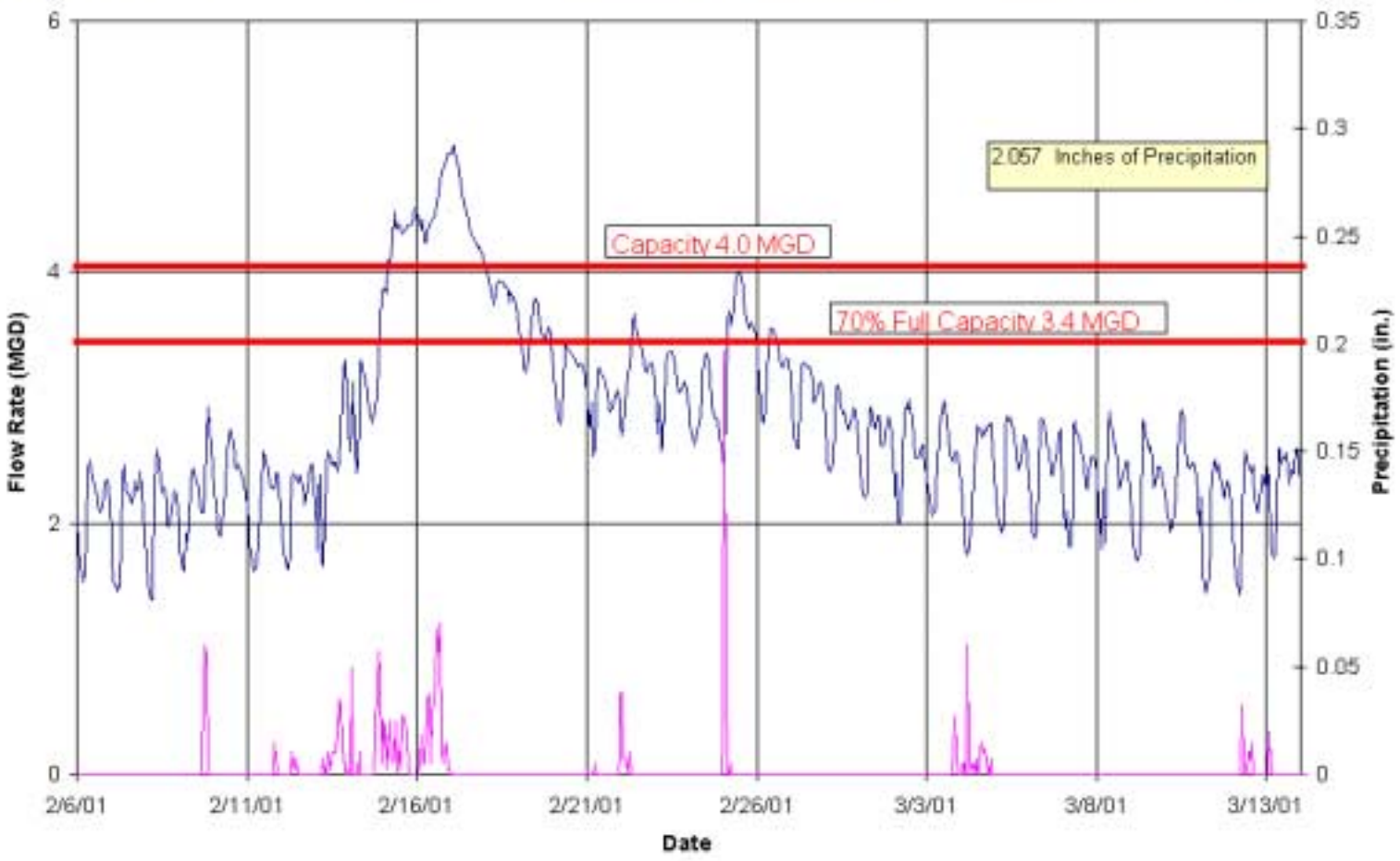
Smith Seckman Reid, Inc.
Engineering and Information Management



MWSD

Flow Meter 6
2/06/01-3/14/01

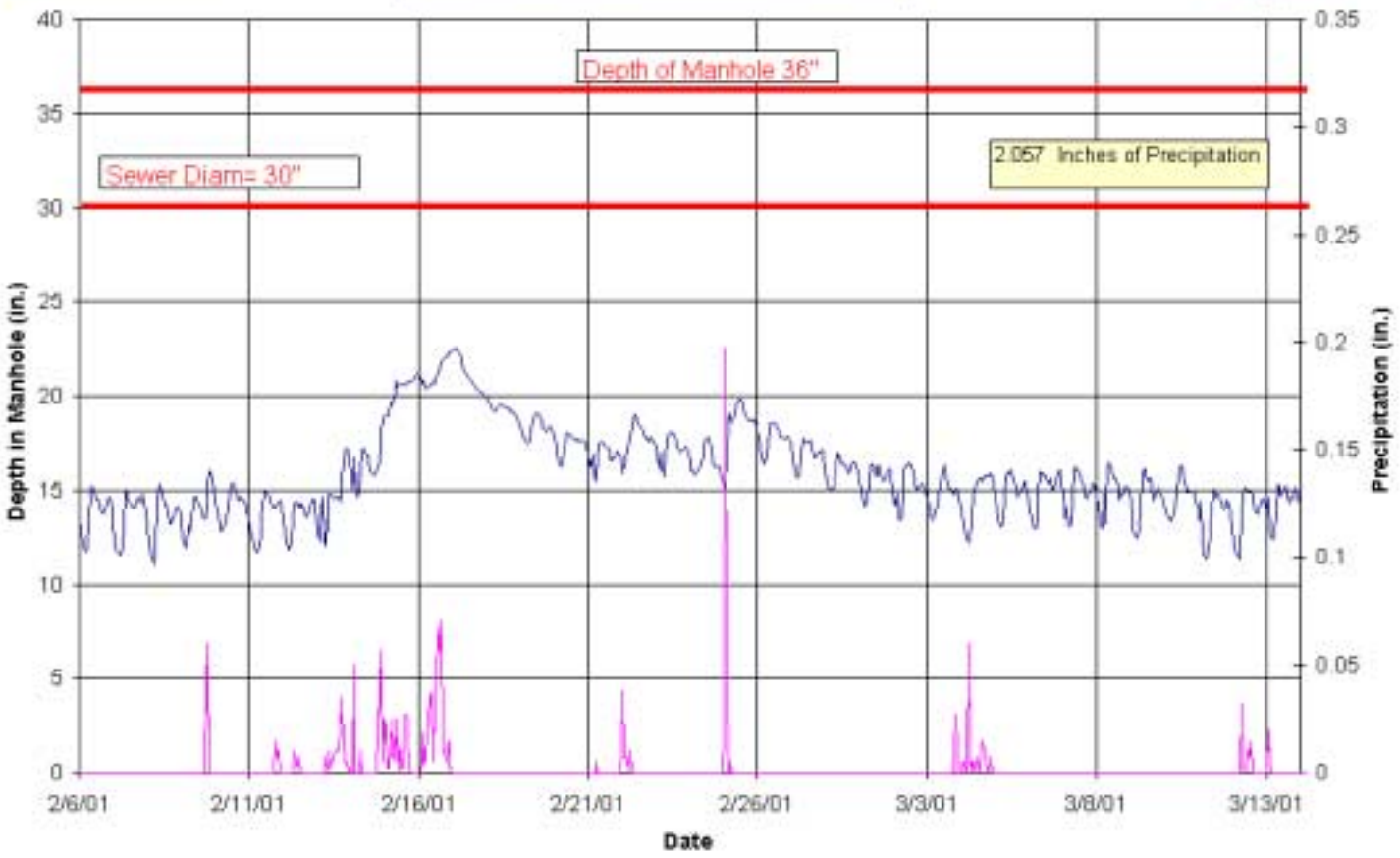
Smith Seckman Reid, Inc.
Engineering and Information Management



MWSD

Flow Meter 6
2/06/01-3/14/01

Smith Seckman Reid, Inc.
Engineering and Information Management

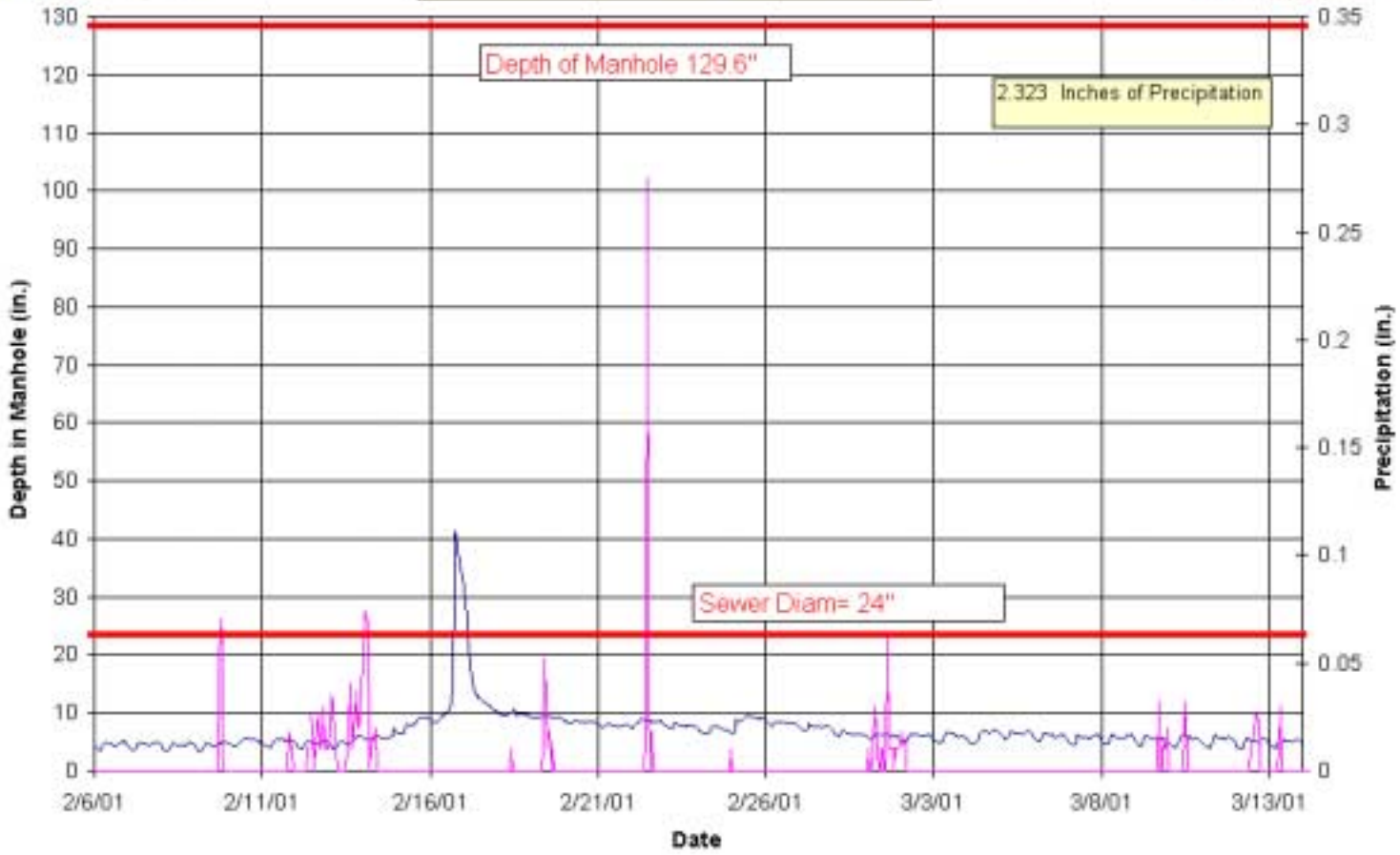



MWSD
Flow Meter 7
2/06/01-3/14/01
Flow Rate
Precipitation
SSR
Smith
Seckman
Reid, Inc.
Engineering and Information
Management
2.323 Inches of Precipitation
Capacity 4.6 MGD
70% Full Capacity 3.9 MGD
Flow Rate (MGD)
Precipitation (in.)
Date
12
9
6
3
0
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2/6/01
2/11/01
2/16/01
2/21/01
2/26/01
3/3/01
3/8/01
3/13/01

MWSD

Flow Meter 7
2/06/01-3/14/01

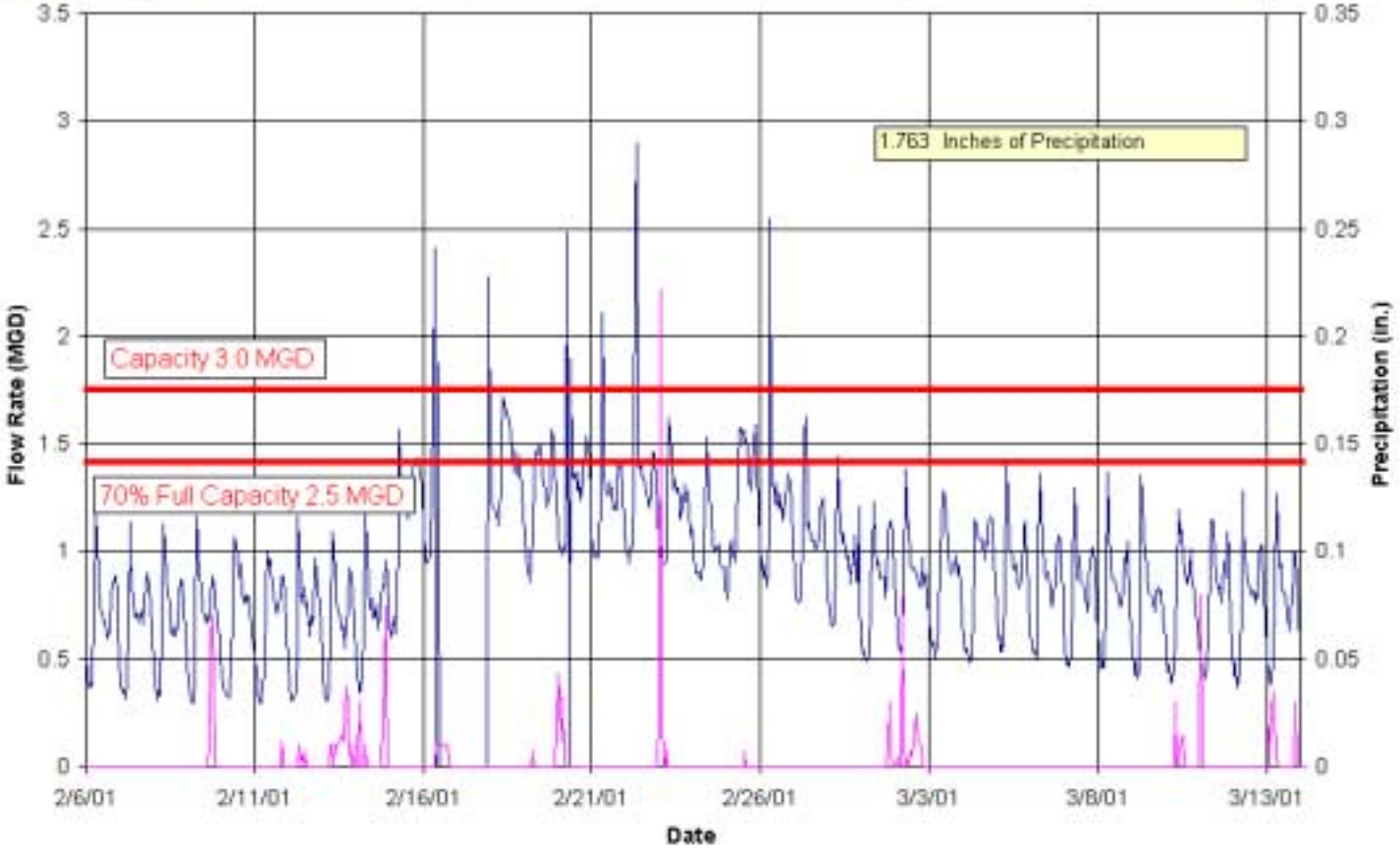
Smith Seckman Reid, Inc.
Engineering and Information Management



MWSD

Flow Meter 8
2/06/01-3/14/01

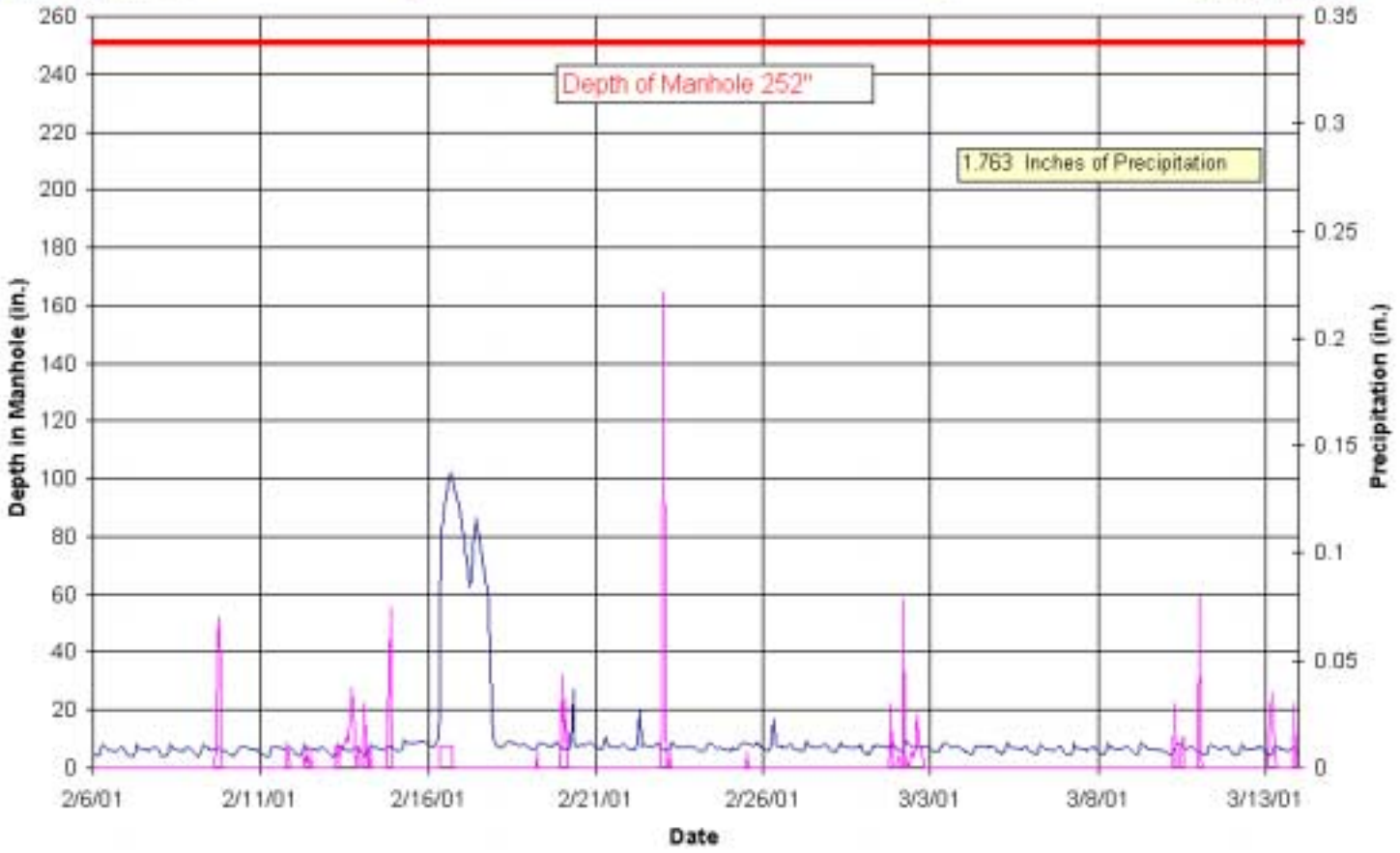
Smith Seckman Reid, Inc.
Engineering and Information Management

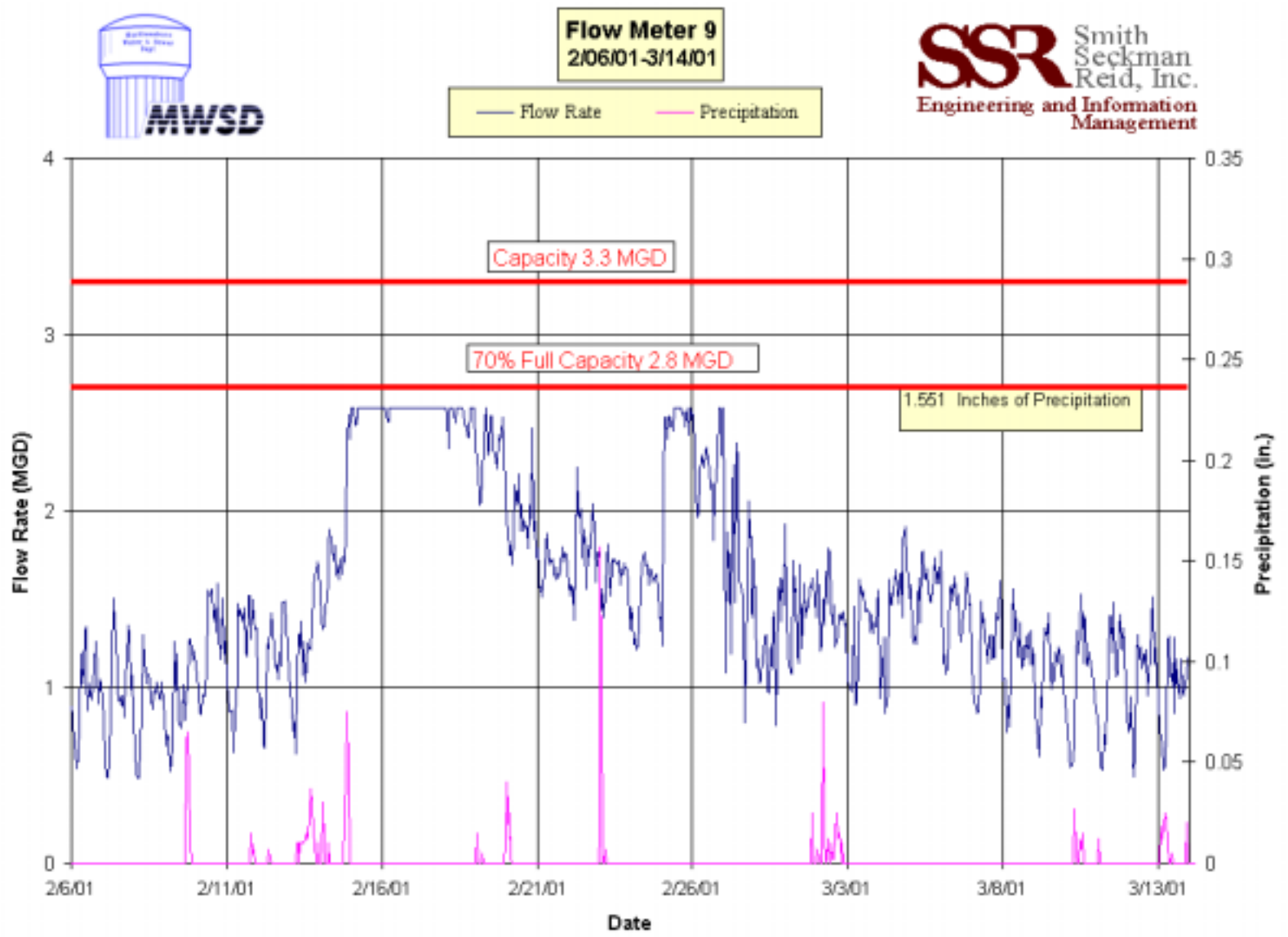


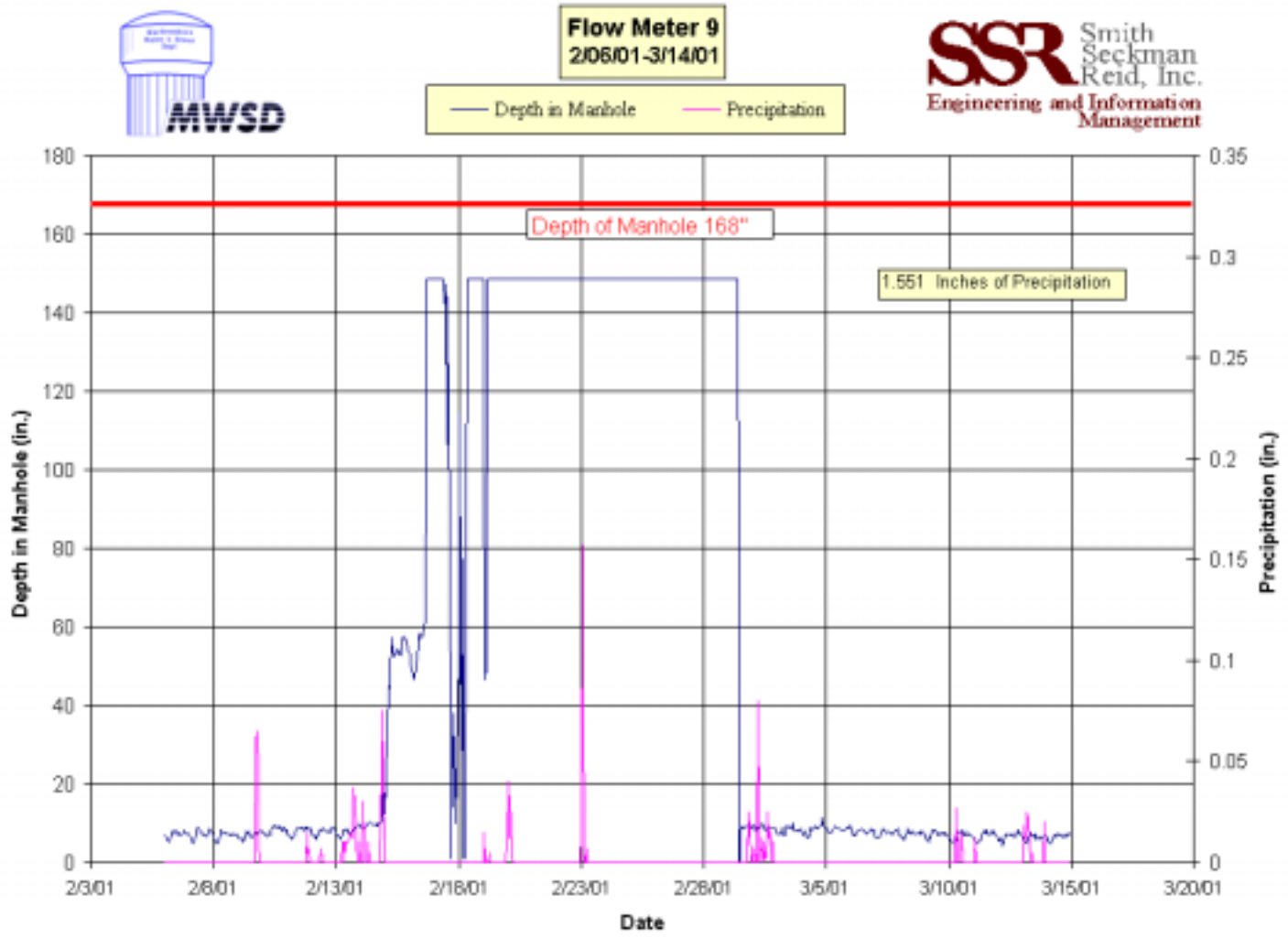
MWSD

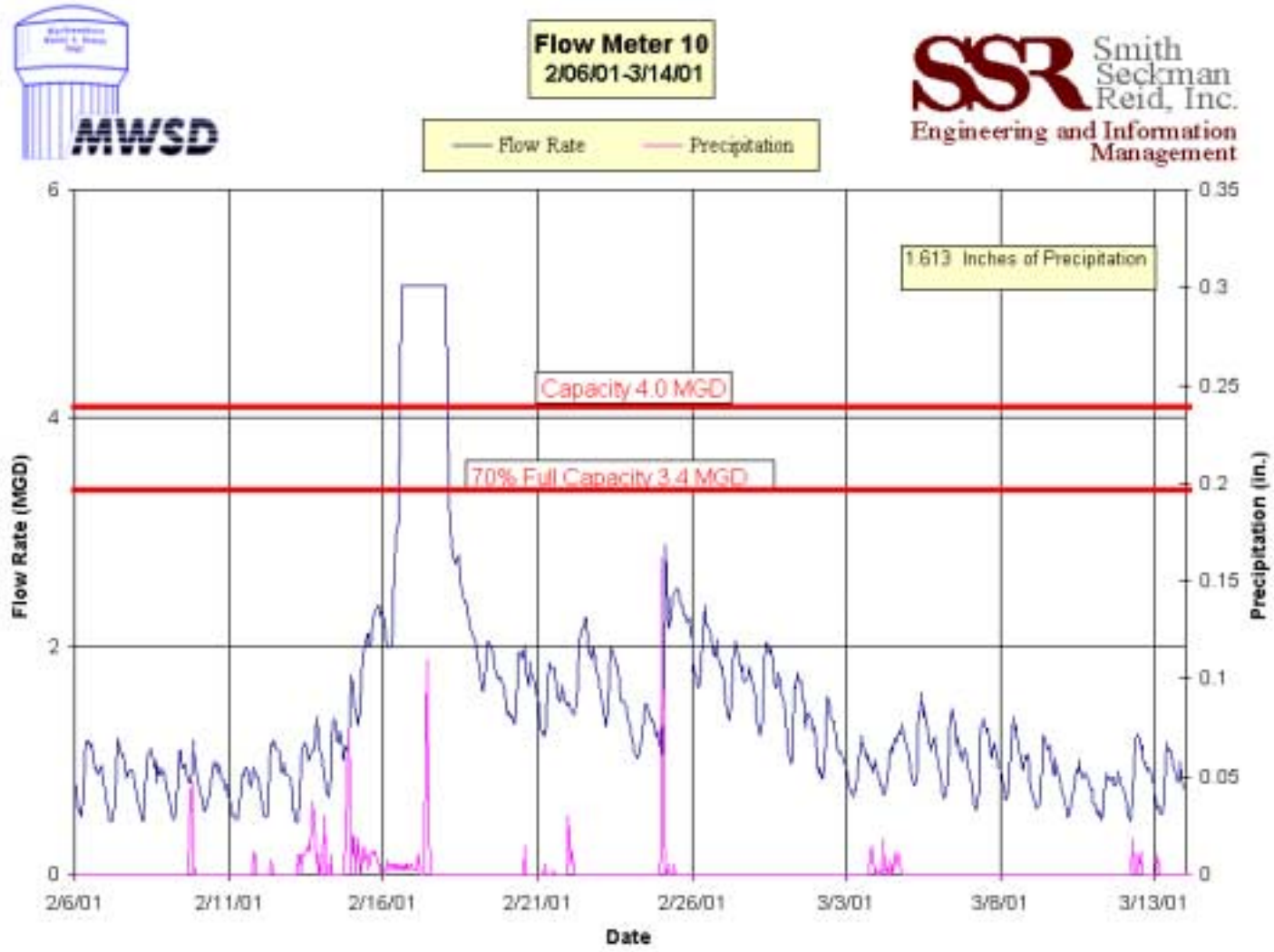
Flow Meter 8
2/06/01-3/14/01

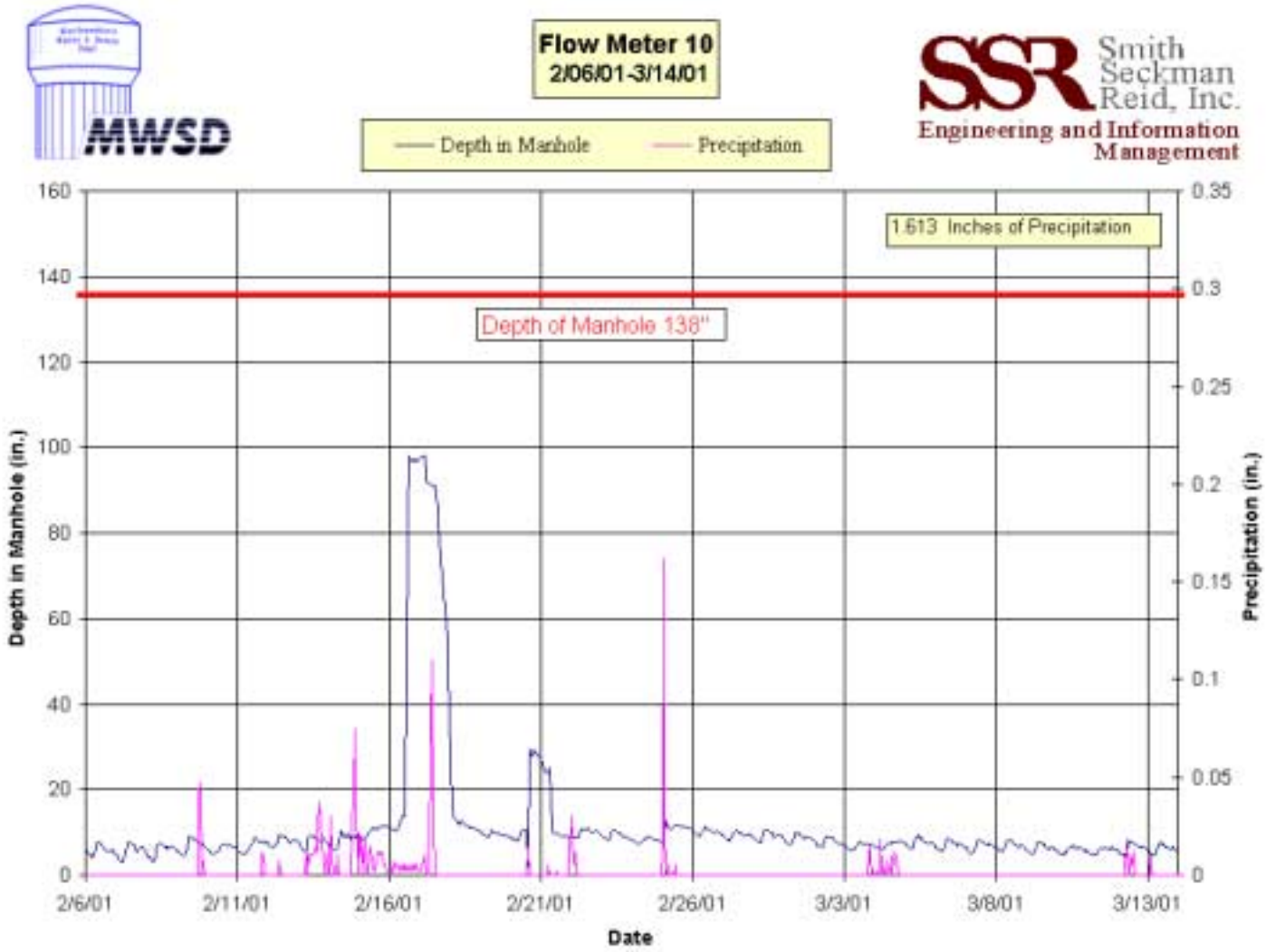
Smith Seckman Reid, Inc.
Engineering and Information Management

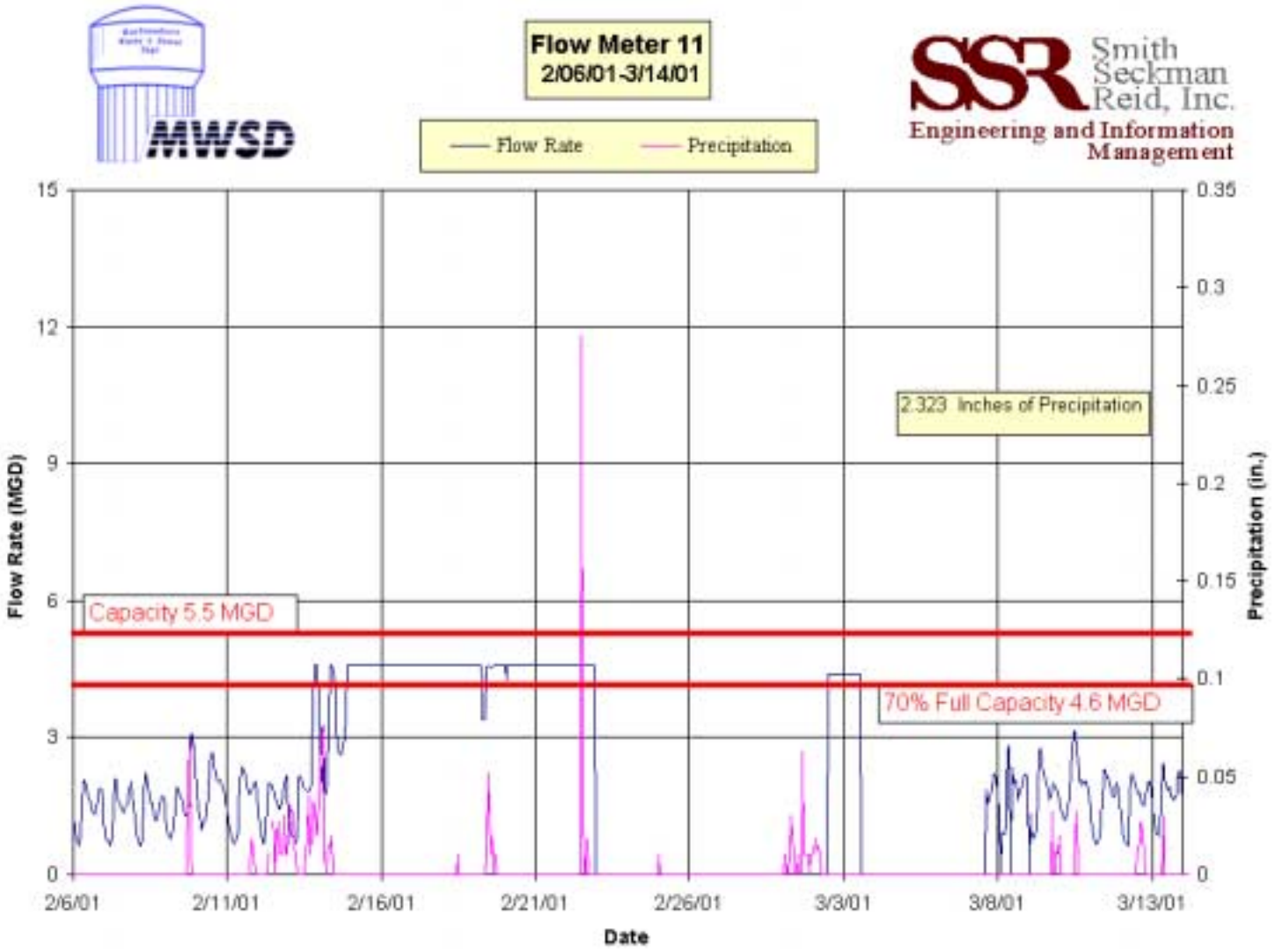


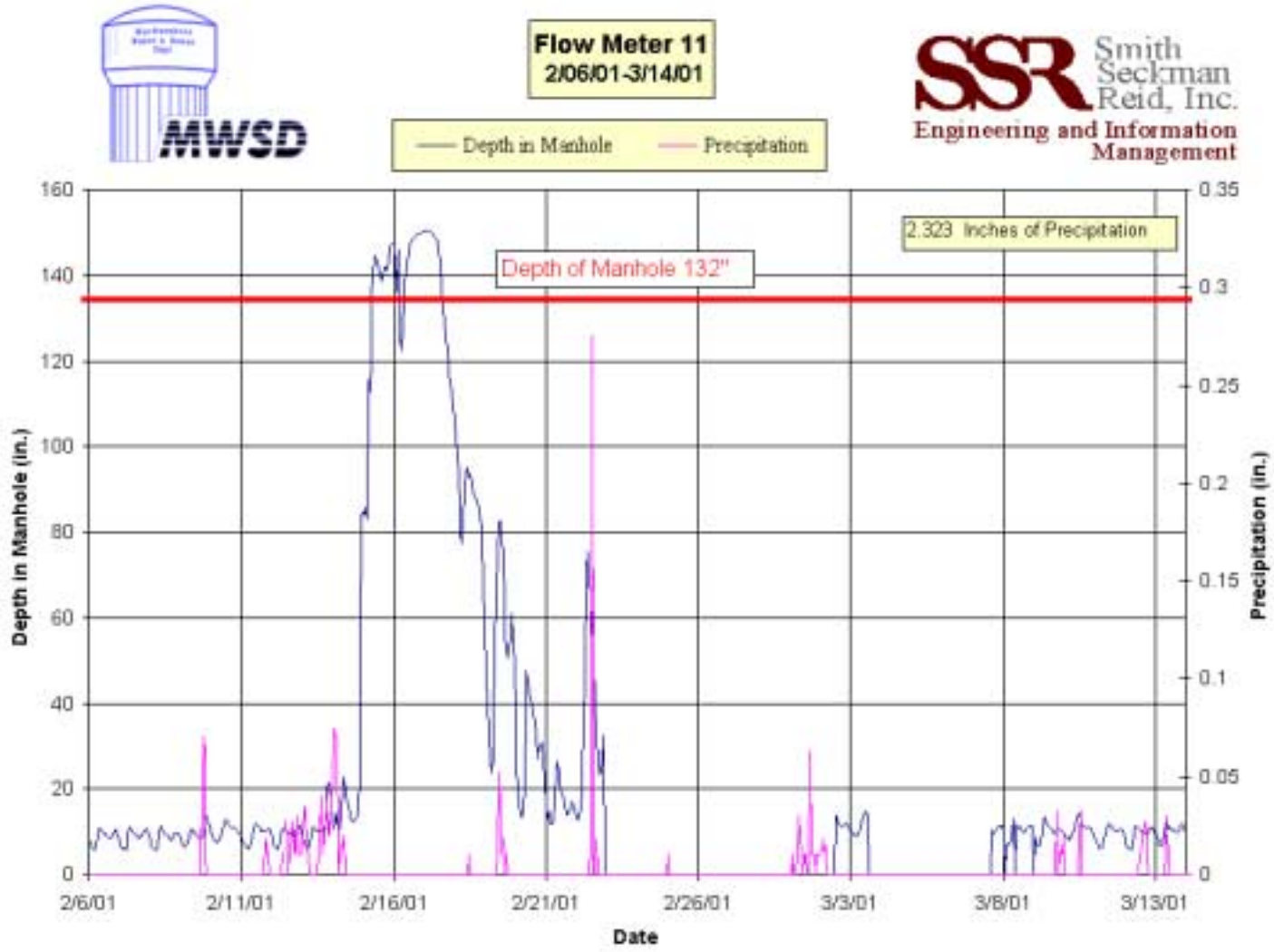

MWSD
Flow Meter 9
2/06/01-3/14/01
Flow Rate
Precipitation
SSR
Smith
Seckman
Reid, Inc.
Engineering and Information
Management
Capacity 3.3 MGD
70% Full Capacity 2.8 MGD
1.551 Inches of Precipitation
Flow Rate (MGD)
Precipitation (in.)
Date
0
1
2
3
4
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
2/6/01
2/11/01
2/16/01
2/21/01
2/26/01
3/3/01
3/8/01
3/13/01

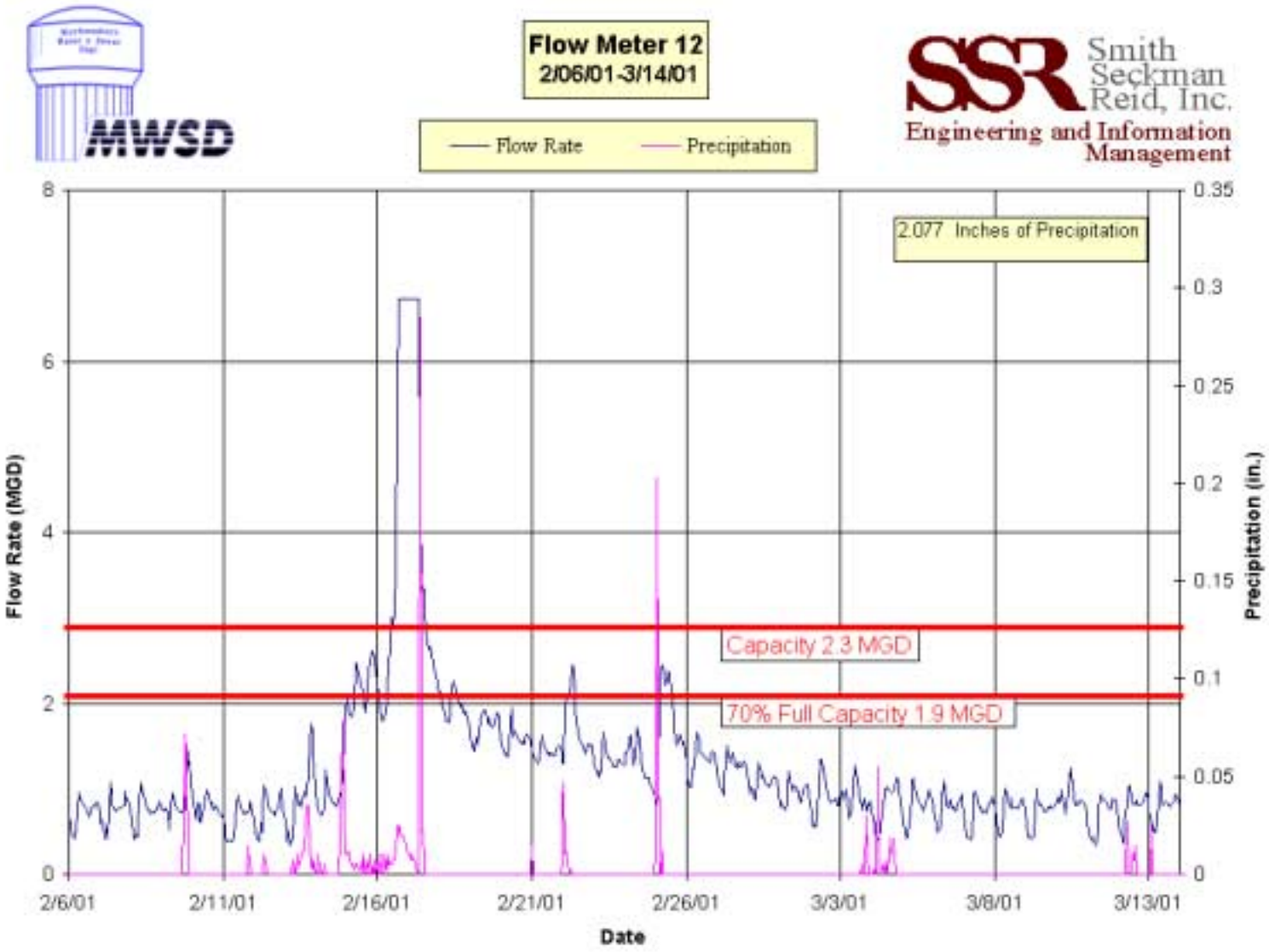

MWSD
Flow Meter 9
2/06/01-3/14/01
Depth in Manhole
Precipitation
SSR
Smith
Seckman
Reid, Inc.
Engineering and Information Management
Depth of Manhole 168"
1.551 Inches of Precipitation
Depth in Manhole (in.)
Precipitation (in.)
Date
180
160
140
120
100
80
60
40
20
0
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2/3/01
2/8/01
2/13/01
2/18/01
2/23/01
2/28/01
3/5/01
3/10/01
3/15/01
3/20/01

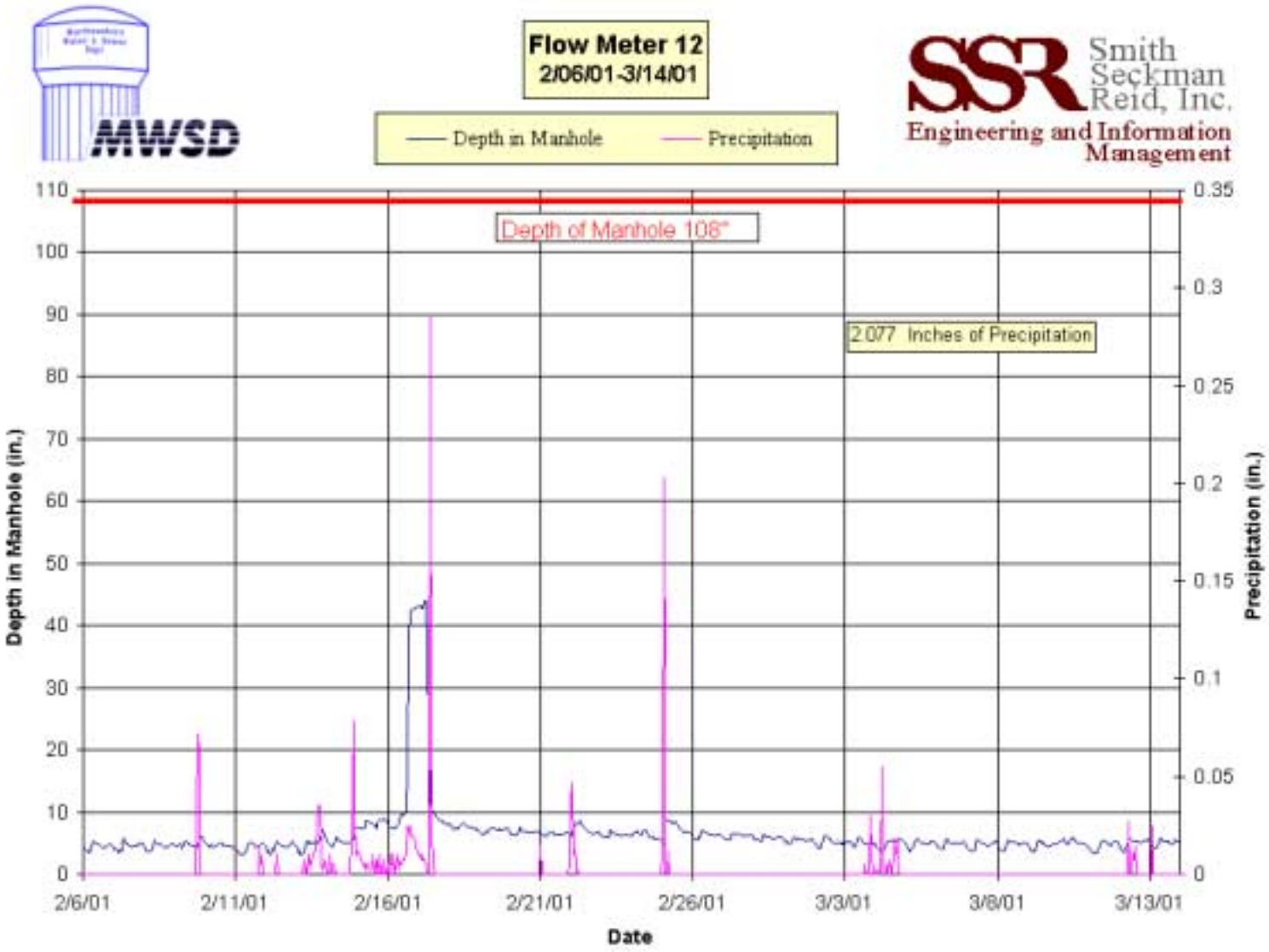

MWSD
Flow Meter 10
2/06/01-3/14/01
Flow Rate
Precipitation
SSR
Smith
Seckman
Reid, Inc.
Engineering and Information
Management
1.613 Inches of Precipitation
Capacity 4.0 MGD
70% Full Capacity 3.4 MGD
Flow Rate (MGD)
Precipitation (in.)
Date
0
2
4
6
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
2/6/01
2/11/01
2/16/01
2/21/01
2/26/01
3/3/01
3/8/01
3/13/01


MWSD
Flow Meter 10
2/06/01-3/14/01
Depth in Manhole
Precipitation
SSR
Smith
Seckman
Reid, Inc.
Engineering and Information
Management
1.613 Inches of Precipitation
Depth of Manhole 138"
Depth in Manhole (in.)
Precipitation (in.)
160
140
120
100
80
60
40
20
0
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2/6/01
2/11/01
2/16/01
2/21/01
2/26/01
3/3/01
3/8/01
3/13/01
Date


MWSD
Flow Meter 11
2/06/01-3/14/01
Flow Rate
Precipitation
SSR
Smith
Seckman
Reid, Inc.
Engineering and Information
Management
2.323 Inches of Precipitation
Capacity 5.5 MGD
70% Full Capacity 4.6 MGD
Flow Rate (MGD)
Precipitation (in.)
Date
15
12
9
6
3
0
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2/6/01
2/11/01
2/16/01
2/21/01
2/26/01
3/3/01
3/8/01
3/13/01


MWSD
Flow Meter 11
2/06/01-3/14/01
Depth in Manhole
Precipitation
SSR
Smith
Seckman
Reid, Inc.
Engineering and Information
Management
2.323 Inches of Precipitation
Depth of Manhole 132"
Depth in Manhole (in.)
Precipitation (in.)
160
140
120
100
80
60
40
20
0
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2/6/01
2/11/01
2/16/01
2/21/01
2/26/01
3/3/01
3/8/01
3/13/01
Date


MWSD
Flow Meter 12
2/06/01-3/14/01
Flow Rate
Precipitation
SSR
Smith
Seckman
Reid, Inc.
Engineering and Information
Management
2.077 Inches of Precipitation
Capacity 2.3 MGD
70% Full Capacity 1.9 MGD
Flow Rate (MGD)
Precipitation (in.)
Date
0
2
4
6
8
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
2/6/01
2/11/01
2/16/01
2/21/01
2/26/01
3/3/01
3/8/01
3/13/01


MWSD
Flow Meter 12
2/06/01-3/14/01
Depth in Manhole
Precipitation
SSR
Smith
Seckman
Reid, Inc.
Engineering and Information
Management
Depth of Manhole 108"
2.077 Inches of Precipitation
Depth in Manhole (in.)
Precipitation (in.)
Date
110
100
90
80
70
60
50
40
30
20
10
0
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2/6/01
2/11/01
2/16/01
2/21/01
2/26/01
3/3/01
3/8/01
3/13/01

APPENDIX C

POPULATION AND FLOW PROJECTIONS
BY SANITARY DISTRICT AND COLLECTION SYSTEM

TABLE II-3 SANITARY DISTRICTS PROJECTED WASTEWATER FLOWS

				1990		2000					PLANNING PERIOD PROJECTIONS						STUDY PERIOD PROJECTIONS					
SANITARY DISTRICT	AREA-AC.	1990 POPULATION	AVERAGE FLOW(GPD)	PEAK FACTOR	PEAK FLOW(GPD)	2000 POPULATION	POPULATION SERVED	SERVICE FACTOR*	AVERAGE FLOW(GPD)	PEAK FACTOR	PEAK FLOW(GPD)	2020 POPULATION	2020 POPULATION	SERVICE FACTOR	AVERAGE FLOW(GPD)	PEAK FACTOR	PEAK FLOW(GPD)	2050 POPULATION	2050 POPULATION	SERVICE	AVERAGE FLOW(GPD)	PEAK FACTOR	PEAK FLOW(GPD)
1	164	320	41600	5	208000	647	647	1	84149	3	252447	700	700	1	91000	3	273000	700	700	1	91000	3	273000
2	405	1000	130000	3.25	422500	1430	1430	1	185842.8	3	557528.4	1600	1600	1	208000	3	624000	1800	1800	1	234000	3	702000
3	51	175	22750	5	113750	248	248	1	32181.5	5	160907.5	275	275	1	35750	4	143000	275	275	1	35750	4	143000
4	89	200	26000	5	130000	436	436	1	56719	4	226876	436	436	1	56680	3	170040	436	436	1	56680	3	170040
5	115	370	48100	5	240500	531	531	1	69023.5	4	276094	600	600	1	78000	3	234000	650	650	1	84500	3	253500
6	40	175	22750	5	113750	146	146	1	19012.5	5	95062.5	200	200	1	26000	4	104000	250	250	1	32500	4	130000
7	414	2500	325000	3.25	1056250	2092	2092	1	271960	3	815880	2200	2200	1	286000	3	858000	2600	2600	1	338000	3	1014000
8	166	850	110500	4	442000	568	568	1	73889.4	4	295557.6	580	580	1	75400	3	226200	600	600	1	78000	3	234000
9	546	2800	364000	3.25	1183000	4357	4357	1	566356.7	3	1699070.1	6000	6000	1	780000	3	2340000	7500	7500	1	975000	3	2925000
10	473	1000	130000	3.25	422500	1952	1952	1	253822.4	3	761467.2	2050	2050	1	266500	3	799500	2500	2500	1	325000	3	975000
11	54	400	52000	5	260000	241	241	1	31320.9	5	156604.5	400	400	1	52000	3	156000	425	425	1	55250	3	165750
12	907	5000	650000	3.25	2112500	4554	4554	1	592020	3	1776060	7500	7500	1	975000	3	2925000	11000	11000	1	1430000	3	4290000
13	119	300	39000	5	195000	354	354	1	46013.5	5	230067.5	500	500	1	65000	3	195000	600	600	1	78000	3	234000
14	83	300	39000	5	195000	266	266	1	34619	5	173095	500	500	1	65000	3	195000	600	600	1	78000	3	234000
15	146	400	52000	5	260000	671	671	1	87275.5	4	349102	1050	1050	1	136500	3	409500	1250	1250	1	162500	3	487500
16	215	1350	175500	3.25	570375	2478	2478	1	322133.5	3	966400.5	2600	2600	1	338000	3	1014000	2700	2700	1	351000	3	1053000
17	196	660	85800	4	343200	1214	1214	1	157862.9	3	473588.7	1400	1400	1	182000	3	546000	1600	1600	1	208000	3	624000
18	927	4310	560300	3.25	1820975	5498	5498	1	714694.5	3	2144083.5	6500	6500	1	845000	3	2535000	6800	6800	1	884000	3	2652000
19	68	500	65000	4	260000	315	315	1	40970.8	5	204854	315	315	1	40950	4	163800	315	315	1	40950	3	122850
20	150	245	31850	5	159250	546	546	1	70915	4	283660	546	546	1	70980	3	212940	546	546	1	70980	3	212940
20-IND		IND	22700	2	45400		0	1	22700	5	113500	IND	0	1	50000	3	150000	IND	0	1	100000	3	300000
21	200	IND	80800	2	161600	276	276	1	35925.5	5	179627.5	IND	0	1	40000	4	160000	IND	0	1	50000	3	150000
22	60	IND	15800	2	31600	7	7	1	863.2	5	4316	IND	0	1	20000	4	80000	IND	0	1	30000	4	120000
23	109	300	39000	5	195000	230	230	1	29913	5	149565	300	300	1	39000	4	156000	450	450	1	58500	3	175500
23-IND	IND		0	5	0		0	1	0	5	4132.231405		0	1	10000	5	50000	IND		0	1	20000	4	80000
24	178	1750	227500	3.25	739375	1376	1376	1	178913.8	3	536741.4	1400	1400	1	182000	3	546000	1550	1550	1	201500	3	604500
25	132	100	13000	5	65000	289	289	1	37566.1	5	187830.5	300	300	1	39000	4	156000	350	350	1	45500	3	136500
25-IND		IND	19200	2	38400		0	1	19200	5	96000	IND	0	1	40000	4	160000	IND	0	1	80000	3	240000
26	106	225	29250	5	146250	619	619	1	80525.9	4	322103.6	700	700	1	91000	3	273000	800	800	1	104000	3	312000
26-IND		IND	42700	2	85400		0	1	42700	5	213500	IND	0	1	80000	3	240000	IND	0	1	100000	3	300000
27	89	500	65000	4	260000	360	360	1	46780.5	5	233902.5	500	500	1	65000	3	195000	550	550	1	71500	3	214500
28	326	2100	273000	3.25	887250	1329	1329	1	172822	3	518466	1800	1800	1	234000	3	702000	2000	2000	1	260000	3	780000
29	247	2100	273000	3.25	887250	1430	1430	1	185835	3	557505	1800	1800	1	234000	3	702000	2000	2000	1	260000	3	780000
30	186	IND	12700	2	25400	504	504	1	65468	4	261872	IND	0	1	70000	3	210000	IND	0	1	80000	3	240000
31	193	150	19500	5	97500	311	311	1	40462.5	5	202312.5	200	200	1	26000	4	104000	250	250	1	32500	4	130000
31-IND		IND	26200	2	52400		0	1	12000	5	60000	IND	0	1	24000	4	96000	IND	0	1	48000	3	144000
32	94	400	52000	5	260000	557	557	1	72449	4	289796	600	600	1	78000	3	234000	700	700	1	91000	3	273000
33	703	IND	224600	2	449200	381	381	1	249528.7	3	748586.1	IND	0	1	400000	3	1200000	IND	0	1	500000	3	1500000
34	124	SCH+200	50000	2	100000	304	304	1	39535.6	5	197678	SCH+200	0	1	60000	3	180000	SCH+200	0	1	120000	3	360000
35	210	400	52000	5	260000	1004	1004	1	130500.5	3	391501.5	1500	1500	1	195000	3	585000	1750	1750	1	227500	3	682500
36	199	400	52000	5	260000	201	201	1	26156	5	130780	300	300	1	39000	4	156000	400	400	1	52000	3	156000
37	42	IND	0	2	0	23	23	1	2964	5	14820	IND	0	1	35000	4	140000	IND	0	1	67000	3	201000
38	165		0	0	0	2	2	1	260	5	1300	450	450	1	58500	3	175500	600	600	1	78000	3	234000
39	65	IND	206800	2	413600		0	1	206800	3	620400	IND	0	1	350000	3	1050000	IND	0	1	500000	3	1500000
40	89	IND	0	2	0	71	71	1	9256	5	46280	IND	0	1	42000	4	168000	IND	0	1	99700	3	299100
41	105	150	19500	5	97500	8	8	1	1066	5	5330	IND	0	1	45000	4	180000	IND	0	1	0	5	0
42	218	IND	0	2	0	653	653	1	84857.5	4	339430	IND	0	1	400000	3	1200000	IND	0	1	500000	3	1500000
42-IND						IND	0		283000				0		500000	3	1500000		0	1	750000		
43	180	IND	0	2	0	56	56	1	7312.5	5	36562.5	IND	0	1	20000	4	80000	IND	0	1	40000	3	120000
44	74	30	3900	5	19500	0	0	1	0	5	0	0	0	1	0	5	0	0	0	1	0	5	0
45	418	2280	296400	3.25	963300	1434	1434	1	186436.25	3	559308.75	2100	2100	1	273000	3	819000	2500	2500	1	325000	3	975000
46	206	COM	0	2	0	330	330	1	42908.125	5	214540.625	COM	0	1	80000	3	240000	COM	0	1	150000	3	450000
47	304	200	26000	5	130000	193	193	1	25116	5	125580	900	900	1	117000	3	351000	1000	1000	1	130000	3	390000
48	266	COM	0	5	0	305	305	1	39699.4	5	198497	COM	0	1	50000	3	150000	COM	0	1	70000	3	210000
49	134	100	13000	5	65000	0	0	1	54.6	5	273	300	300	1	39000	4	156000	400	400	1	52000	3	156000
50	137	COM	0	2	0	13	13	1	1690	5	8450	COM	0	1	10000	5	50000	COM	0	1	20000	4	80000
51	33	COM	0	2	0	14	14	1	1820	5	9100	COM	0	1	20000	4	80000	COM	0	1	30000	4	120000
52	65	45	5850	5	29250	104	104	1	13539.5	5	67697.5	150	150	1	19500	5	97500	200	200	1	26000	4	104000
53	33	0	0	0	0	4	4	1	500.5	5	2502.5	30	30	1	3900	5	19500	70	70	1	9100	5	45500
54	542	100	13000	5	65000	326	326	1	42419	5	212095	COM	0	1	26400	4	105601.4692	IND	0	1	0	5	0
55	611	0	0	0	0	190	190	1	24732.5	5	123662.5	COM	0	1	26400	4	105601.4692	IND	0	1	0	5	0
56	748	250	32500	5	162500	452	452	1	58792.5	4	235170	500	500	1	65000	3	195000	600	600	1	78000	3	234000
57	433	0	0	0	0	224	224	1	29055	5	145275	COM	0	1	30000	4	120000	COM	0	1	30000	4	120000
57-IND	100	IND	0	2	0		0	1	30000	5	150000	COM	0	1	50000	3	150000	IND	0	1	81700	3	245100
58	106	200	26000	5	130000	297	297	1	38564.5	5	192822.5	300	300	1	39000	4	156000	300	300	1	39000	4	156000
59	513	700	91000	4	364000	612	612	1	79586	4	318344	1100	1100	1	143000	3	429000	1300	1300	1	169000	3	507000
60	223	0	0	0	0	335	335	1	43485	5	217425	500	500	1	65000	3	195000	600	600	1	78000	3	234000
61	651	3100	403000	3.25	1309750	2078	2078	1	270171.2	3	810513.6	2500	2500	1	325000	3	975000	3500	3500	1	455000	3	1365000
62	6218	437	56810	5	284050	5315	1860	0.35	84647.26725	4	338589.069	13051	6525.5	0.5	424157.5	3	1272472.5	22000	22000	1	2860000	3	8580000
63	6931	0	0	0	0	5260	1315	0.25	42737.09375	5	213685.4688	6000	6000	1	780000	3	2340000	15,000.00	15000	1	1950000	3	5850000
64	1797	400	52000	5	260000	2316	811	0.35	36884.68875	5	184423.4438	3000	3000	1	390000	3	1170000	3500	3500	1	455000	3	1365000
65 \A1	1959	75	9750	5	48750	2395	1197	0.5	77822.875	4	311291.5	3250	3250	1	422500	3	1267500	4100	4100	1	533000	3	1599000

TABLE II-3 SANITARY DISTRICTS PROJECTED WASTEWATER FLOWS

SANITARY DISTRICT	AREA-AC.	1990 POPULATION	1990 AVERAGE FLOW(GPD)	1990 PEAK FACTOR	1990 PEAK FLOW(GPD)	2000 POPULATION	2000 POPULATION SERVED	2000 SERVICE FACTOR*	2000 AVERAGE FLOW(GPD)	2000 PEAK FACTOR	2000 PEAK FLOW(GPD)	PLANNING PERIOD PROJECTIONS 2020 POPULATION	2020 POPULATION	2020 SERVICE FACTOR	2020 AVERAGE FLOW(GPD)	2020 PEAK FACTOR	2020 PEAK FLOW(GPD)	STUDY PERIOD PROJECTIONS 2050 POPULATION	2050 POPULATION	2050 SERVICE	2050 AVERAGE FLOW(GPD)	2050 PEAK FACTOR	2050 PEAK FLOW(GPD)
66	2204	0	0	0	0	1802	901	0.5	58552	4	234208	3000	3000	1	390000	3	1170000	6000	6000	1	780000	3	2340000
66-VA		VA	125000	2	250000		0	1	121000	3	363000	VA	0	1	250000	3	750000	VA	0	1	350000	3	1050000
67	1784	400	52000	5	260000	4132	4132	1	537102.8	3	1611308.4	4500	4500	1	585000	3	1755000	5000	5000	1	650000	3	1950000
68	1050	0	0	0	0	452	226	0.5	14704.625	5	73523.125	1200	1200	1	156000	3	468000	2300	2300	1	299000	3	897000
69	657	1400	182000	3.25	591500	1788	1788	1	232446.5	3	697339.5	2090	2090	1	271700	3	815100	2200	2200	1	286000	3	858000
70	5265	0	0	0	0	3544	2658	0.75	259158.6563	3	777475.9688	7025	7025	1	913250	3	2739750	16694	16694	1	2170220	3	6510660
70-IND		IND	252700	2	505400		0	1	243850	3	731550	IND	0	1	300000	3	900000	IND	0	1	400000	3	1200000
71	4066	0	0	0	0	2202	1101	0.5	71565	4	286260	4500	4500	1	585000	3	1755000	8500	8500	1	1105000	3	3315000
72	2856	0	0	0	0	4476	3357	0.75	327292.875	3	981878.625	10000	10000	1	1300000	3	3900000	16000	16000	1	2080000	3	6240000
73	500	0	0	0	0	4	0	0	0	5	0	300	300	1	39000	4	156000	700	700	1	408500	3	1225500
74	450	0	0	0	0	291	0	0	0	5	0	300	300	1	39000	4	156000	750	750	1	97500	3	292500
75 (WWTP)	143					5	5	1	650	5	3250	50	50	1	6500	5	32500	75	75	1	9750	5	48750
76	180	IND	80000	2	160000	110	110	1	14339	5	71695	IND	0	1	120000	3	360000	IND	0	1	163000	3	489000
76-IND		500	65000	4	260000		0	1	40810	5	204050	200	200	1	26000	4	104000	500	500	1	65000	3	195000
77 (SRBF)	197					28	0	0	0	5	0	75	0	0	0	5	0	100	100	1	13000	4	52000
78	213	500	65000	4	260000	587	587	1	76251.5	4	305006	600	600	1	78000	3	234000	700	700	1	91000	3	273000
79	201	150	19500	5	97500	313	313	1	40638	5	203190	400	400	1	52000	3	156000	450	450	1	58500	3	175500
80	80	150	19500	5	97500	479	479	1	62223.2	4	248892.8	500	500	1	65000	3	195000	550	550	1	71500	3	214500
81	215	100	13000	5	65000	1070	1070	1	139126	3	417378	1250	1250	1	162500	3	487500	1500	1500	1	195000	3	585000
83	290					45	45	1	5850	5	29250	100	50	0.5	3250	5	16250	125	125	1	16250	4	65000
85 (AIRPORT)	305	75	9750	5	48750	577	577	1	75010	4	300040	1100	1100	1	143000	3	429000	1500	1500	1	195000	3	585000
86	2996					468	0	0	0	5	0	700	175	0.25	5687.5	5	28437.5	1357	1357	1	176410	3	529230
87	12507					1861	0	0	0	5	0	6334	6333.5	1	823355	3	2470065	15834	15833.75	1	2058387.5	3	6175162.5
88	8086					2963	0	0	0	5	0	5200	1300	0.25	42250	4	169000	7500	7500	1	975000	3	2925000
89	6280	0	0	0	0	1043	0	0	0	5	0	2400	2400	1	312000	3	936000	6000	6000	1	780000	3	2340000
90	2198					196	0	0	0	5	0	250	62.5	0.25	2031.25	5	10156.25	1000	1000	1	130000	3	390000
91	1833	0	0	0	0	1332	0	0	0	5	0	3348	3347.5	1	435175	3	1305525	8369	8368.75	1	1087937.5	3	3263812.5
92	5627					1061	0	0	0	5	0	4185	4184.5	1	543985	3	1631955	8369	8369	1	1087970	3	3263910
93	4259	0	0	0	0	1750	263	0.15	5119.335	5	25596.675	14645	14645.3125	1	1903890.625	3	5711671.875	29291	29290.625	1	3807781.25	3	11423343.75
94	3093					1007	0	0	0	5	0	1350	675	0.5	43875	4	175500	1700	1700	1	221000	3	663000
95	2946					1175	0	0	0	5	0	1250	312.5	0.25	10156.25	5	50781.25	2300	2300	1	299000	3	897000
96	1308	0	0	0	0	1045	157	0.15	3056.625	5	15283.125	2511	2511	1	326381.25	3	979143.75	4184	4184.375	1	543968.75	3	1631906.25
97	3818	0	0	0	0	1279	141	0.11	2011.47375	5	10057.36875	5021	5021	1	652762.5	3	1958287.5	8369	8368.75	1	1087937.5	3	3263812.5
98	2732					447	0	0	0	5	0	600	150	0.25	4875	5	24375	1800	1800	1	234000	3	702000
99	2825	0	0	0	0	972	0	0	0	5	0	1000	500	0.5	32500	4	130000	3200	3200	1	416000	3	1248000
100	752	0	0	0	0	694	76	0.11	1091.9766	5	5459.883	2092	2092	1	271984.375	3	815953.125	4184	4184.375	1	543968.75	3	1631906.25
101	1748	0	0	0	0	948	190	0.2	4928.508	5	24642.54	4097	4096.875	1	532593.75	3	1597781.25	6828	6828.125	1	887656.25	3	2662968.75
102	1710	0	0	0	0	629	0	0	0	5	0	3000	1500	0.5	97500	3	292500	6000	6000	1	780000	3	2340000
103	394	0	0	0	0	28	7	0.25	227.09375	5	1135.46875	800	800	1	104000	3	312000	1200	1200	1	156000	3	468000
104	1751	0	0	0	0	2869	0	0	0	5	0	2520	2520	1	327600	3	982800	4000	4000	1	520000	3	1560000
105	263	0	0	0	0	16	4	0.25	125.9375	5	629.6875	250	250	1	32500	4	130000	500	500	1	65000	3	195000
106	415	0	0	0	0	235	0	0	0	5	0	315	0	0	0	5	0	397	397	1	51610	3	154830
107	2873	0	0	0	0	1155	0	0	0	5	0	1800	0	0	0	5	0	2500	2500	1	325000	3	975000
108	894	0	0	0	0	251	0	0	0	5	0	1500	0	0	0	5	0	525	525	1	68250	3	204750
109	568	0	0	0	0	52	0	0	0	5	0	125	0	0	0	5	0	176	176	1	22880	4	91520
110	1147	0	0	0	0	108	0	0	0	5	0	135	0	0	0	5	0	226	226	1	29380	4	117520
111	1508	0	0	0	0	211	0	0	0	5	0	550	0	0	0	5	0	2000	2000	1	260000	3	780000
112	823	0	0	0	0	46	0	0	0	5	0	110	0	0	0	5	0	200	200	1	26000	4	104000
113	760	0	0	0	0	75	0	0	0	5	0	150	0	0	0	5	0	250	250	1	32500	4	130000
114	427	0	0	0	0	49	0	0	0	5	0	120	0	0	0	5	0	130	130	1	16900	4	67600
115	1162	0	0	0	0	525	0	0	0	5	0	650	0	0	0	5	0	750	750	1	97500	3	292500
116	2383					279	0	0	0	5	0	325	0	0	0	5	0	350	350	1	45500	3	136500
117	2193	0	0	0	0	1107	0	0	0	5	0	1500	0	0	0	5	0	1400	1400	1	182000	3	546000
118	1019	0	0	0	0	584	0	0	0	5	0	900	0	0	0	5	0	1100	1100	1	143000	3	429000
119	1772	0	0	0	0	330	0	0	0	5	0	703	0	0	0	5	0	800	800	1	104000	3	312000
120	1208	0	0	0	0	463	0	0	0	5	0	500	0	0	0	5	0	750	750	1	97500	3	292500
121	1659	0	0	0	0	287	0	0	0	5	0	600	0	0	0	5	0	1000	1000	1	130000	3	390000
122	1047	0	0	0	0	184	0	0	0	5	0	200	0	0	0	5	0	2000	2000	1	260000	3	780000
123	1643	0	0	0	0	898	0	0	0	5	0	1200	600	0.5	39000	4	156000	1450	1450	1	188500	3	565500
124	6502	0	0	0	0	927	0	0	0	5	0	3422	1711	0.5	111215	3	333645	15000	15000	1	1950000	3	5850000
125	911	0	0	0	0	157	0	0	0	5	0	200	0	0	0	5	0	250	250	1	32500	4	130000
TOTAL	**150,546**	**42,622**	**6,700,060**	**2.5**	**16,750,150**	**112,343**	**68,816**		**9,303,937**	**3.29**	**30,623,591**	**193,230**	**165,210**		***23,679,636***	**3.05**	**72,177,333**	**326,500**	**326,500**		**47,141,868**	**2.96**	**139,698,463**
						NOT SERVED	***43,526***					***NOT SERVED***	***28,020***					***NOT SERVED***	**-**				

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STONES RIVER INTERCEPTOR

43,035	Stones River		Calculated	Calculated	Actual	Actual	Actual	Flow Meter	Sewer Size Reqd	Sewer Size Required
	District	Population	Avg Flow	Peak Flow	Avg Flow	Peak Flow	Peak Factor	Location	@ 2 fps ADF	@ 2 fps- Peak Flow
43,035	**75**	**5**	**5,594,574**	**16,783,722**	**11,670,439**	**28,351,000**	**2**	**MF 01**	**28**	**49**
43,030	58	297	5,593,924	16,781,772					28	49
42,734	79	313	5,555,359	16,666,078					28	49
42,421	76	110	5,514,721	16,544,164					28	48
42,311	76-IND	314	5,500,382	16,501,147					28	48
41,997	57	224	5,459,572	16,378,717					28	48
41,773	57-IND	231	5,430,517	16,291,552					28	48
41,542	56	452	5,400,517	16,201,552					28	48
41,090	54	163	5,341,725	16,025,175					28	48
40,927	2	1,430	5,320,515	15,961,546					27	48
39,497	Stones River	19,049	5,134,673	15,404,018					27	47
20,448	4	436	2,658,302	7,974,906					19	34
20,012	31	311	2,601,583	7,804,749					19	33
19,701	31-IND	92	2,561,121	7,683,362					19	33
19,609	Lower Lytle	6,425	2,549,121	7,647,362					19	33
13,183	Lower Lytle-2	13,183	1,713,840	5,141,519					16	27
6,425	**Lower Lytle Creek**		**Calculated**	**Calculated**	**Actual**	**Actual**	**Actual**	**Flow Meter**	**Sewer Size Reqd**	**Sewer Size Required**
	District	**Population**	**Avg Flow**	**Peak Flow**	**Avg Flow**	**Peak Flow**	**Peak Factor**	**Location**	**@ 2 fps ADF**	**@ 2 fps- Peak Flow**
6,425	**30-IND**	**504**	**835,281**	**2,505,843**	**995,791**	**3,868,000**	**4**	**MF 04**	**12**	**19**
5,922	29	1,430	769,813	2,309,439					10	18
4,492	7	2,092	583,978	1,751,934					9	16
2,400	32	557	312,018	936,054					7	12
1,843	15	671	239,569	718,707					6	10
1,171	10	1,171	152,293	456,880					5	8
13,183	**Lower Lytle Creek-2**		**Calculated**	**Calculated**	**Actual**	**Actual**	**Actual**	**-**	**Sewer Size Reqd**	**Sewer Size Required**
		Population	**Avg Flow**	**Peak Flow**	**Avg Flow**	**Peak Flow**	**Peak Factor**	**-**	**@ 2 fps ADF**	**@ 2 fps- Peak Flow**
13,183	**26**	**310**	**1,713,840**	**5,141,519**	**2,351,982**	**7,997,000**	**3**	**MF 05**	**16**	**27**
12,874	26-IND	328	1,673,577	5,020,730					15	27
12,545	25	289	1,630,877	4,892,630					15	26
12,256	25-IND	148	1,593,311	4,779,932					15	26
12,109	Bradyville	9,848	1,574,111	4,722,332					15	26
2,261	Upper Lytle	2,261	293,890	881,670					6	11
2,261	**Upper Lytle Creek**		**Calculated**	**Calculated**	**Actual**	**Actual**	**Actual**	**Flow Meter**	**Sewer Size Reqd**	**Sewer Size Required**
	District	**Population**	**Avg Flow**	**Peak Flow**	**Avg Flow**	**Peak Flow**	**Peak Factor**	**Location**	**@ 2 fps ADF**	**@ 2 fps- Peak Flow**
2,261	23	115	293,890	881,670					6	11
2,146	21-IND	111	278,934	836,801					6	11
2,035	20	546	264,563	793,690					6	11
1,490	20-IND	175	193,648	580,945					5	9
1,315	63	1,315	170,948	512,845					5	9
									-	
9,848	**Bradyville Road**		**Calculated**	**Calculated**	**Actual**	**Actual**	**Actual**	**Flow Meter**	**Sewer Size Reqd**	**Sewer Size Required**
	District	**Population**	**Avg Flow**	**Peak Flow**	**Avg Flow**	**Peak Flow**	**Peak Factor**	**Location**	**@ 2 fps ADF**	**@ 2 fps- Peak Flow**
9,848	28	1,329	1,280,221	3,840,662					13	23
8,518	**23**	**115**	**1,107,399**	**3,322,196**	**935,656**	**10,637,000**	**11**	**MF 07**	**13**	**22**
8,403	23-IND	-	1,092,442	3,277,326					12	22
8,403	24	1,376	1,092,442	3,277,326					12	22
7,027	18	5,498	913,528	2,740,585					11	20
1,529	17	1,214	198,834	596,501					5	9
315	19	315	40,971	122,912					2	4
19,049	**Stones River Interceptor Ext.**		**Calculated**	**Calculated**	**Actual**	**Actual**	**Actual**	**Flow Meter**	**Sewer Size Reqd**	**Sewer Size Required**
	District	**Population**	**Avg Flow**	**Peak Flow**	**Avg Flow**	**Peak Flow**	**Peak Factor**	**Location**	**@ 2 fps ADF**	**@ 2 fps- Peak Flow**
19,049	27	360	2,476,371	7,429,112					19	32
18,689	26	310	2,429,590	7,288,770					19	32
18,379	83	45	2,389,327	7,167,981					18	32
18,334	**53**	**4**	**2,383,477**	**7,150,431**	**2,221,617**	**8,742,000**	**4**	**MF 06**	**18**	**32**
18,331	SW INT	18,331	2,382,977	7,148,930					18	32
18,331	**Southwest Interceptor**		**Calculated**	**Calculated**	**Actual**	**Actual**	**Actual**	**Flow Meter**	**Sewer Size Reqd**	**Sewer Size Required**
	District	**Population**	**Avg Flow**	**Peak Flow**	**Avg Flow**	**Peak Flow**	**Peak Factor**	**Location**	**@ 2 fps ADF**	**@ 2 fps- Peak Flow**
18,331	52	104	2,382,977	7,148,930					18	32
18,226	49	0	2,369,437	7,108,311					18	32
18,226	51-COM	14	2,369,382	7,108,147					18	32
18,212	Samsonite	5,328	2,367,562	7,102,687					18	32
12,884	**43-IND**	**56**	**1,674,936**	**5,024,808**	**1,702,174**	**4,576,623**	**3**	**MF 11**	**15**	**27**
12,828	50-COM	13	1,667,624	5,002,871					15	27
12,815	48-COM	305	1,665,934	4,997,801					15	27
12,509	47	193	1,626,234	4,878,703					15	26
12,316	55	190	1,601,118	4,803,355					15	26
12,126	54	163	1,576,386	4,729,157					15	26
11,963	46-COM	330	1,555,176	4,665,529					15	26
11,633	SW Relief Sewer	11,633	1,512,268	4,536,804					15	25
11,633	**Southwest Relief Sewer**	**-**	**Calculated**	**Calculated**	**Actual**	**Actual**	**Actual**	**Flow Meter**	**Sewer Size Reqd**	**Sewer Size Required**
	District	**Population**	**Avg Flow**	**Peak Flow**	**Avg Flow**	**Peak Flow**	**Peak Factor**	**Location**	**@ 2 fps ADF**	**@ 2 fps- Peak Flow**
11,633	44	-	1,512,268	4,536,804					15	25
11,633	45	1,434	1,512,268	4,536,804					15	25
10,199	72	3,357	1,325,832	3,977,496					14	24
6,842	38	2	889,441	2,668,324					11	19
6,840	**36**	**201**	**889,181**	**2,667,544**	**813,990**	**6,736,000**	**8**	**MF 12**	**11**	**19**
6,639	35	1,004	863,025	2,589,076					11	19
5,635	70	2,658	732,525	2,197,575					10	18
2,977	70-IND	1,876	386,980	1,160,940					7	13
1,101	71	1,101	143,130	429,390						8
5,328	**Samsonite Relief Sewer**		**Calculated**	**Calculated**	**Actual**	**Actual**	**Actual**	**Flow Meter**	**Sewer Size Reqd**	**Sewer Size Required**
	District	**Population**	**Avg Flow**	**Peak Flow**	**Avg Flow**	**Peak Flow**	**Peak Factor**	**Location**	**@ 2 fps ADF**	**@ 2 fps- Peak Flow**
5,328	41	8	692,626	2,077,879					10	17
5,320	40-IND	71	691,560	2,074,681					10	17
5,248	42	653	682,304	2,046,913					10	17
4,596	42-IND	2,177	597,447	1,792,340					9	16
2,419	37-IND	23	314,447	943,340					7	12
2,396	22-IND	7	311,483	934,448					7	12
2,389	21-IND	166	310,620	931,859					7	11
2,224	33-IND	1,919	289,064	867,193					6	11
304	34-IND	304	39,536	118,607					2	4

SINKING CREEK INTERCEPTOR

32,528	Sinking Creek		Calculated	Calculated	Actual	Actual	Actual	Flow Meter	Sewer Size Reqd	Sewer Size Required
	District	Population	Avg Flow	Peak Flow	Avg Flow	Peak Flow	Peak Factor	Location	@ 2 fps ADF	@ 2 fps- Peak Flow
32,528	**1**	**647**	**4,228,635**	**12,685,904**	**4,614,272**	**7,170,000**	**2**	**MF 02**	**24**	**42**
31,881	VA Int	7,372	4,144,486	12,433,457					24	42
24,508	78	587	3,186,071	9,558,213					21	37
23,922	69	1,788	3,109,820	9,329,459					**21**	**36**
22,134	80	479	2,877,373	8,632,119					**20**	**35**
21,655	Bushman	11,279	2,815,150	8,445,450					**20**	**35**
10,376	**3**	**248**	**1,348,915**	**4,046,746**	**1,602,581**	**5,251,000**	**3**	**MF 03**	**14**	**24**
10,129	81	1,070	1,316,734	3,950,202					14	24
9,059	5	531	1,177,608	3,532,824					13	22
8,528	6	146	1,108,584	3,325,753					13	22
8,381	8	568	1,089,572	3,268,716					12	22
7,813	10	781	1,015,682	3,047,047					12	21
7,032	**16**	**2,478**	**914,154**	**2,742,461**	**798,632**	**5,157,000**	**6**	**MF 10**	**11**	**20**
4,554	12	4,554	592,020	1,776,060					9	16

11,279	Bushman's Creek		Calculated	Calculated	Actual	Actual	Actual	Flow Meter	Sewer Size Reqd	Sewer Size Required
	District	Population	Avg Flow	Peak Flow	Avg Flow	Peak Flow	Peak Factor	Location	@ 2 fps ADF	@ 2 fps- Peak Flow
11,279	61	2,078	1,466,235	4,398,704					14	25
9,200	60	335	1,196,063	3,588,190					13	23
8,866	85-AIRPORT	577	1,152,578	3,457,735					13	22
8,289	**NE Int**	**5,830**	**1,077,568**	**3,232,705**	**1,078,104**	**2,588,000**	**2**	**MF 09**	**12**	**21**
2,459	65	599	319,672	959,017					7	12
1,860	62	1,860	241,849	725,548					6	10

5,830	North East Interceptor		Calculated	Calculated	Actual	Actual	Actual	Flow Meter	Sewer Size Reqd	Sewer Size Required
	District	Population	Avg Flow	Peak Flow	Avg Flow	Peak Flow	Peak Factor	Location	@ 2 fps ADF	@ 2 fps- Peak Flow
5,830	59	612	757,896	2,273,688					10	18
5,218	9	4,357	678,310	2,034,930					10	17
861	14	266	111,953	335,860					4	7
595	11	241	77,334	232,003					3	6
354	13	354	46,014	138,041					3	4

7,372	VA Interceptor		Calculated	Calculated	Actual	Actual	Actual	Flow Meter	Sewer Size Reqd	Sewer Size Required
	District	Population	Avg Flow	Peak Flow	Avg Flow	Peak Flow	Peak Factor	Location	@ 2 fps ADF	@ 2 fps- Peak Flow
7,372	**67**	**4,132**	**958,415**	**2,875,244**	**747,682**	**2,588,000**	**3**	**MF 08**	**12**	**20**
3,241	VA	931	421,312	1,263,935					8	13
2,310	66	901	300,312	900,935					7	11
1,409	119	-	183,208	549,623					5	9
1,409	65	599	183,208	549,623					5	9
811	64	811	105,385	316,154					4	7

1,063			Calculated	Calculated	Sewer Size Reqd	ewer Size Require	Existing Sewer
	Overall Creek Sewer System	Population	Avg Flow	Peak Flow	@ 2 fps ADF	@ 2 fps- Peak Flow	Size
1,063	105	4	138,184	414,551	4	8	30
1,059	68	226	137,680	413,039	4	8	
833	103	7	108,271	324,812	4	7	
826	101	190	107,362	322,086	4	7	
636	100	76	82,720	248,159	3	6	
560	96	157	72,793	218,378	3	6	
403	97	141	52,415	157,245	3	5	
263	Stewart Creek	-	34,129	102,387	2	4	
263	91	-	34,129	102,387	2	4	
263	93	263	34,129	102,387	2	4	
-	89	-	-	-	-	-	
-	92	-	-	-	-	-	
-	90	-	-	-	-	-	

STONES RIVER INTERCEPTOR

85,523		Stones River	Cumulative	2020 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
		District	Population	Population	Flow- ADF	Flow- Peak		@ 2 fps- Peak Flow	
		75	**85,523**	50	11,117,945	33,353,835		69	42
		58	**85,473**	300	11,111,445	33,334,335	40	69	
		79	**85,173**	400	11,072,445	33,217,335	40	69	
		76	**84,773**	200	11,020,445	33,061,335	40	68	
		76-IND	**84,573**	923	10,994,445	32,983,335	39	68	
		57	**83,650**	-	10,874,445	32,623,335	39	68	
		57-IND	**83,650**	385	10,874,445	32,623,335	39	68	
		56	**83,265**	500	10,824,445	32,473,335	39	68	
		54	**82,765**	-	10,759,445	32,278,335	39	68	
		2	**82,765**	1,600	10,759,445	32,278,335	39	68	
		Stones River	**81,165**	50,842	10,551,445	31,654,335	39	67	
		4	**30,323**	436	3,941,940	11,825,820	24	41	
		31	**29,887**	200	3,885,260	11,655,780	23	41	
		31-IND	**29,687**	185	3,859,260	11,577,780	23	41	
		Lower Lytle	**29,502**	7,418	3,835,260	11,505,780	23	40	
		Lower Lytle-2	**22,084**	22,084	2,870,860	8,612,580	20	35	

7,418		Lower Lytle Creek	Cumulative	2020 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		30-IND	**7,418**	538	964,400	2,893,200	12	20	21
		29	**6,880**	1,800	894,400	2,683,200	11	20	
		7	**5,080**	2,200	660,400	1,981,200	10	17	
		32	**2,880**	600	374,400	1,123,200	7	13	
		15	**2,280**	1,050	296,400	889,200	6	11	
		10	**1,230**	1,230	159,900	479,700	5	8	

22,084		Lower Lytle Creek	Cumulative	2020 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		26	**22,084**	**350**	2,870,860	8,612,580	20	35	30
		26-IND	**21,734**	615	2,825,360	8,476,080	20	35	
		25	**21,118**	300	2,745,360	8,236,080	20	34	
		25-IND	**20,818**	308	2,706,360	8,119,080	20	34	
		Bradyville	**20,510**	11,565	2,666,360	7,999,080	19	34	
		Upper Lytle	**8,945**	8,945	1,162,910	3,488,730	13	22	

8,945		Upper Lytle Creek	Cumulative	2020 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		23	**8,945**	150	1,162,910	3,488,730	13	22	
		21-IND	**8,795**	154	1,143,410	3,430,230	13	22	
		20	**8,642**	546	1,123,410	3,370,230	13	22	
		20-IND	**8,096**	385	1,052,430	3,157,290	12	21	
		63	**7,711**	6,000	1,002,430	3,007,290	12	21	
		124	**1,711**	1,711	222,430	667,290	6	10	

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11,565		Bradyville Road	Cumulative	2020 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		28	**11,565**	**1,800**	1,503,450	4,510,350	15	25	
		23	**9,765**	**150**	1,269,450	3,808,350	13	23	24
		23-IND	**9,615**	**-**	1,249,950	3,749,850	13	23	
		24	**9,615**	**1,400**	1,249,950	3,749,850	13	23	
		18	**8,215**	**6,500**	1,067,950	3,203,850	12	21	
		17	**1,715**	**1,400**	222,950	668,850	6	10	
		19	**315**	**315**	40,950	122,850	2	4	

50,842		Stones River Interceptor Ext.	Cumulative	2020 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		27	**50,842**	500	6,609,505	19,828,515	31	53	
		26	**50,342**	350	6,544,505	19,633,515	30	53	
		83	**49,992**	50	6,499,005	19,497,015	30	53	
		53	**49,942**	30	6,492,505	19,477,515	30	53	30
		SW INT	**49,912**	49,912	6,488,605	19,465,815	30	53	

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49,912		Southwest Interceptor	Cumulative	2020 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		52	**49,912**	150	6,488,605	19,465,815	30	53	
		49	**49,762**	300	6,469,105	19,407,315	30	52	
		51-COM	**49,462**	154	6,430,105	19,290,315	30	52	
		Samsonite	**49,309**	11,362	6,410,105	19,230,315	30	52	
		43-IND	**37,947**	154	4,933,105	14,799,315	26	46	21
		50-COM	**37,793**	77	4,913,105	14,739,315	26	46	
		48-COM	**37,716**	385	4,903,105	14,709,315	26	46	
		47	**37,332**	900	4,853,105	14,559,315	26	45	
		55	**36,432**	-	4,736,105	14,208,315	26	45	
		54	**36,432**	-	4,736,105	14,208,315	26	45	
		46-COM	**36,432**	615	4,736,105	14,208,315	26	45	
		SW Relief Sewer	**35,816**	35,816	4,656,105	13,968,315	26	45	

35,816		Southwest Relief Sewer	Cumulative	2020 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		44	**35,816**	-	4,656,105	13,968,315	26	45	
		45	**35,816**	2,100	4,656,105	13,968,315	26	45	
		72	**33,716**	10,000	4,383,105	13,149,315	25	43	
		38	**23,716**	450	3,083,105	9,249,315	21	36	
		36	**23,266**	300	3,024,605	9,073,815	21	36	18
		35	**22,966**	1,500	2,985,605	8,956,815	21	36	
		70	**21,466**	7,025	2,790,605	8,371,815	20	34	
		70-IND	**14,441**	2,308	1,877,355	5,632,065	16	28	
		87	**12,134**	6,334	1,577,355	4,732,065	15	26	
		71	**5,800**	4,500	754,000	2,262,000	10	18	
		88	**1,300**	1,300	169,000	507,000	5	8	

11,362		Samsonite Relief Sewer	Cumulative	2020 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		41	**11,362**	-	1,477,000	4,431,000	14	25	
		40-IND	**11,362**	323	1,477,000	4,431,000	14	25	
		42-IND	**11,038**	3,846	1,435,000	4,305,000	14	25	
		42	**7,192**	3,077	935,000	2,805,000	12	20	
		37-IND	**4,115**	269	535,000	1,605,000	9	15	
		22-IND	**3,846**	154	500,000	1,500,000	8	15	
		21-IND	**3,692**	154	480,000	1,440,000	8	14	
		33-IND	**3,538**	3,077	460,000	1,380,000	8	14	
		34-IND	**462**	462	60,000	180,000	3	5	

SINKING CREEK INTERCEPTOR

		Sinking Creek	Cumulative	2020 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Requ	Existing
48,439		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flo	Sewer Size
		1	**48,439**	700	6,297,015	18,891,045	30	52	30
		VA Int	**47,739**	10,298	6,206,015	18,618,045	30	51	
		78	**37,441**	600	4,867,265	14,601,795	26	46	
		69	**36,841**	2,090	4,789,265	14,367,795	26	45	
		80	**34,751**	500	4,517,565	13,552,695	25	44	
		Bushman	**34,251**	20,426	4,452,565	13,357,695	25	44	
		3	**13,825**	275	1,797,250	5,391,750	16	28	24
		81	**13,550**	1,250	1,761,500	5,284,500	16	27	
		5	**12,300**	600	1,599,000	4,797,000	15	26	
		6	**11,700**	200	1,521,000	4,563,000	15	25	
		8	**11,500**	580	1,495,000	4,485,000	15	25	
		10	**10,920**	820	1,419,600	4,258,800	14	25	
		16	**10,100**	2,600	1,313,000	3,939,000	14	24	21
		12	**7,500**	7,500	975,000	2,925,000	12	20	

		Bushman's Creek	Cumulative	2020 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
20,426		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		61	**20,426**	2,500	2,655,315	7,965,945	19	34	
		60	**17,926**	500	2,330,315	6,990,945	18	31	
		85-AIRPORT	**17,426**	1,100	2,265,315	6,795,945	18	31	
		NE Int	**16,326**	8,500	2,122,315	6,366,945	17	30	18
		65	**7,826**	1,300	1,017,315	3,051,945	12	21	
		62	**6,526**	6,526	848,315	2,544,945	11	19	

		North East Interceptor	Cumulative	2020 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
8,500		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		59	**8,500**	1,100	1,105,000	3,315,000	13	22	16
		9	**7,400**	6,000	962,000	2,886,000	12	20	
		14	**1,400**	500	182,000	546,000	5	9	
		11	**900**	400	117,000	351,000	4	7	
		13	**500**	500	65,000	195,000	3	5	

		VA Interceptor	Cumulative	2020 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
10,298		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		67	**10,298**	4,500	1,338,750	4,016,250	14	24	21
		VA	**5,798**	1,923	753,750	2,261,250	10	18	
		66	**3,875**	1,500	503,750	1,511,250	8	15	
		119	**2,375**	-	308,750	926,250	7	11	
		65	**2,375**	1,300	308,750	926,250	7	11	
		64	**1,075**	600	139,750	419,250	4	8	
		123	**475**	300	61,750	185,250	3	5	
		86	**175**	175	22,750	68,250	2	3	

	East Fork Drainage System	Cumulative	2020 District	Cumulative	Cumulative			
3,490	District	Population	Population	Flow- ADF	Flow- Peak			
	65	3,490	650	453,700	1,361,100	8	14	
	120	2,840	-	369,200	1,107,600	7	13	
	64	2,840	2,540	369,200	1,107,600	7	13	
	123	300	300	39,000	117,000	2	4	
	121	-	-	-	-	-	-	
	122	-	-	-	-	-	-	

		Cumulative	2020 District	Cumulative	Cumulative			
125	Northern Collection System	Population	Population	Flow- ADF	Flow- Peak			
	105	125	125	16,250	48,750	2	3	
	107	-	-	-	-	-	-	
	109	-	-	-	-	-	-	
	110	-	-	-	-	-	-	
	125	-	-	-	-	-	-	
	115	-	-	-	-	-	-	
	112	-	-	-	-	-	-	
	113	-	-	-	-	-	-	
	114	-	-	-	-	-	-	
	111	-	-	-	-	-	-	
	117	-	-	-	-	-	-	
	116	-	-	-	-	-	-	

		Cumulative	2020 District	Cumulative	Cumulative			
4,020	Sulfur Springs Rd Sewer System	Population	Population	Flow- ADF	Flow- Peak			
	104	4,020	2,520	522,600	1,567,800	9	15	
	107	1,500	-	195,000	585,000	5	9	
	108	1,500	-	195,000	585,000	5	9	
	66	1,500	1,500	195,000	585,000	5	9	
	118	-	-	-	-	-	-	
	119	-	-	-	-	-	-	

		Cumulative	2020 District	Cumulative	Cumulative			
44,223	Overall Creek Sewer System	Population	Population	Flow- ADF	Flow- Peak			
	105	44,223	125	5,749,023	17,247,068	29	49	
	68	44,098	1,200	5,732,773	17,198,318	29	49	
	73	42,898	300	5,576,773	16,730,318	28	49	
	74	42,598	300	5,537,773	16,613,318	28	49	
	106	42,298	-	5,498,773	16,496,318	28	48	
	103	42,298	800	5,498,773	16,496,318	28	48	
	101	41,498	4,097	5,394,773	16,184,318	28	48	
	100	37,401	2,092	4,862,179	14,586,536	26	45	
	96	35,309	2,511	4,590,194	13,770,583	26	44	
	97	32,799	5,021	4,263,813	12,791,439	25	43	
	Stewart Creek	27,777	3,138	3,611,051	10,833,152	23	39	
	91	24,640	3,348	3,203,176	9,609,527	21	37	
	93	21,292	14,645	2,768,001	8,304,002	20	34	
	89	6,647	2,400	864,110	2,592,330	11	19	
	92	4,247	4,185	552,110	1,656,330	9	15	
	90	63	63	8,125	24,375	1	2	

		Cumulative	2020 District	Cumulative	Cumulative			
3,138	Stewart Creek Sewer System	Population	Population	Flow- ADF	Flow- Peak			
	102	3,138	1,500	407,875	1,223,625	8	13	
	99	1,638	500	212,875	638,625	5	10	
	98	1,138	150	147,875	443,625	5	8	
	94	988	675	128,375	385,125	4	7	
	95	313	313	40,625	121,875	2	4	

STONES RIVER INTERCEPTOR

		Stones River	Cumulative	2050 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
146,031		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		75	**146,031**	75	18,984,018	56,952,053	52	90	42
		58	**145,956**	300	18,974,268	56,922,803	52	90	
		79	**145,656**	450	18,935,268	56,805,803	52	90	
		76	**145,206**	1,254	18,876,768	56,630,303	52	90	
		76-IND	**143,952**		18,713,768	56,141,303	52	89	
		57	**143,952**	-	18,713,768	56,141,303	52	89	
		57-IND	**143,952**		18,713,768	56,141,303	52	89	
		56	**143,952**	600	18,713,768	56,141,303	52	89	
		54	**143,352**	-	18,635,768	55,907,303	51	89	
		2	**143,352**	1,800	18,635,768	55,907,303	51	89	
		Stones River	**141,552**	88,805	18,401,768	55,205,303	51	88	
		4	**52,747**	436	6,857,110	20,571,330	31	54	
		31	**52,311**	250	6,800,430	20,401,290	31	54	
		31-IND	**52,061**		6,767,930	20,303,790	31	54	
		Lower Lytle	**52,061**	8,050	6,767,930	20,303,790	31	54	
		Lower Lytle-2	**44,011**	44,011	5,721,430	17,164,290	28	49	

		Lower Lytle Creek	Cumulative	2050 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
8,050		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		30-IND	**8,050**		1,046,500	3,139,500	12	21	21
		29	**8,050**	2,000	1,046,500	3,139,500	12	21	
		7	**6,050**	2,600	786,500	2,359,500	11	18	
		32	**3,450**	700	448,500	1,345,500	8	14	
		15	**2,750**	1,250	357,500	1,072,500	7	12	
		10	**1,500**	1,500	195,000	585,000	5	9	

		Lower Lytle Creek	Cumulative	2050 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
44,011		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		26	**44,011**	**400**	5,721,430	17,164,290	28	49	30
		26-IND	**43,611**		5,669,430	17,008,290	28	49	
		25	**43,611**	350	5,669,430	17,008,290	28	49	
		25-IND	**43,261**		5,623,930	16,871,790	28	49	
		Bradyville	**43,261**	12,490	5,623,930	16,871,790	28	49	
		Upper Lytle	**30,771**	30,771	4,000,230	12,000,690	24	41	

		Upper Lytle Creek	Cumulative	2050 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
30,771		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		23	**30,771**	225	4,000,230	12,000,690	24	41	
		21-IND	**30,546**		3,970,980	11,912,940	24	41	
		20	**30,546**	546	3,970,980	11,912,940	24	41	
		20-IND	**30,000**		3,900,000	11,700,000	24	41	
		63	**30,000**	15,000	3,900,000	11,700,000	24	41	
		124	**15,000**	15,000	1,950,000	5,850,000	17	29	

		Bradyville Road	Cumulative	2050 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
12,490		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		28	**12,490**	**2,000**	1,623,700	4,871,100	15	26	
		23	**10,490**	**225**	1,363,700	4,091,100	14	24	24
		23-IND	**10,265**		1,334,450	4,003,350	14	24	
		24	**10,265**	**1,550**	1,334,450	4,003,350	14	24	
		18	**8,715**	**6,800**	1,132,950	3,398,850	13	22	
		17	**1,915**	**1,600**	248,950	746,850	6	10	
		19	**315**	**315**	40,950	122,850	2	4	

		Stones River Interceptor Ext.	Cumulative	2050 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
88,805		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		27	**88,805**	550	11,544,658	34,633,973	40	70	
		26	**88,255**	400	11,473,158	34,419,473	40	70	
		83	**87,855**	125	11,421,158	34,263,473	40	70	
		53	**87,730**	70	11,404,908	34,214,723	40	70	30
		SW INT	**87,660**	87,660	11,395,808	34,187,423	40	70	

		Southwest Interceptor	Cumulative	2050 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
87,660		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		52	**87,660**	200	11,395,808	34,187,423	40	70	
		49	**87,460**	400	11,369,808	34,109,423	40	70	
		51-COM	**87,060**		11,317,808	33,953,423	40	69	
		Samsonite	**87,060**	16,282	11,317,808	33,953,423	40	69	
		43-IND	**70,778**		9,201,108	27,603,323	36	63	21
		50-COM	**70,778**		9,201,108	27,603,323	36	63	
		48-COM	**70,778**		9,201,108	27,603,323	36	63	
		47	**70,778**	1,000	9,201,108	27,603,323	36	63	
		55	**69,778**	-	9,071,108	27,213,323	36	62	
		54	**69,778**	-	9,071,108	27,213,323	36	62	
		46-COM	**69,778**		9,071,108	27,213,323	36	62	
		SW Relief Sewer	**69,778**	69,778	9,071,108	27,213,323	36	62	

		Southwest Relief Sewer	Cumulative	2050 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
69,778		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		44	**69,778**	-	9,071,108	27,213,323	36	62	
		45	**69,778**	2,500	9,071,108	27,213,323	36	62	
		72	**67,278**	16,000	8,746,108	26,238,323	35	61	
		38	**51,278**	600	6,666,108	19,998,323	31	53	
		36	**50,678**	400	6,588,108	19,764,323	31	53	18
		35	**50,278**	1,750	6,536,108	19,608,323	30	53	
		70	**48,528**	16,694	6,308,608	18,925,823	30	52	
		70-IND	**31,834**		4,138,388	12,415,163	24	42	
		87	**31,834**	15,834	4,138,388	12,415,163	24	42	
		71	**16,000**	8,500	2,080,000	6,240,000	17	30	
		88	**7,500**	7,500	975,000	2,925,000	12	20	

		Samsonite Relief Sewer	Cumulative	2050 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
16,282		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		41	**16,282**	-	2,116,700	6,350,100	17	30	
		40-IND	**16,282**	767	2,116,700	6,350,100	17	30	
		42-IND	**15,515**	5,769	2,017,000	6,051,000	17	29	
		42	**9,746**	3,846	1,267,000	3,801,000	13	23	
		37-IND	**5,900**	515	767,000	2,301,000	10	18	
		22-IND	**5,385**	231	700,000	2,100,000	10	17	
		21-IND	**5,154**	385	670,000	2,010,000	10	17	
		33-IND	**4,769**	3,846	620,000	1,860,000	9	16	
		34-IND	**923**	923	120,000	360,000	4	7	

503,878

SINKING CREEK INTERCEPTOR

		Sinking Creek	Cumulative	2050 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	Existing
73,112		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	Sewer Size
		1	**73,112**	700	9,504,560	28,513,680	37	64	30
		VA Int	**72,412**	12,822	9,413,560	28,240,680	37	63	
		78	**59,590**	700	7,746,700	23,240,100	33	57	
		69	**58,890**	2,200	7,655,700	22,967,100	33	57	
		80	**56,690**	550	7,369,700	22,109,100	32	56	
		Bushman	**56,140**	38,165	7,298,200	21,894,600	32	56	
		3	**17,975**	275	2,336,750	7,010,250	18	32	24
		81	**17,700**	1,500	2,301,000	6,903,000	18	31	
		5	**16,200**	650	2,106,000	6,318,000	17	30	
		6	**15,550**	250	2,021,500	6,064,500	17	29	
		8	**15,300**	600	1,989,000	5,967,000	17	29	
		10	**14,700**	1,000	1,911,000	5,733,000	16	29	
		16	**13,700**	2,700	1,781,000	5,343,000	16	28	21
		12	**11,000**	11,000	1,430,000	4,290,000	14	25	

		Bushman's Creek	Cumulative	2050 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
38,165		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		61	**38,165**	3,500	4,961,450	14,884,350	27	46	
		60	**34,665**	600	4,506,450	13,519,350	25	44	
		85-AIRPORT	**34,065**		4,428,450	13,285,350	25	43	
		NE Int	**34,065**	10,425	4,428,450	13,285,350	25	43	18
		65	**23,640**	1,640	3,073,200	9,219,600	21	36	
		62	**22,000**	22,000	2,860,000	8,580,000	20	35	

		North East Interceptor	Cumulative	2050 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
10,425		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		59	**10,425**	1,300	1,355,250	4,065,750	14	24	16
		9	**9,125**	7,500	1,186,250	3,558,750	13	22	
		14	**1,625**	600	211,250	633,750	5	9	
		11	**1,025**	425	133,250	399,750	4	8	
		13	**600**	600	78,000	234,000	3	6	

		VA Interceptor	Cumulative	2050 District	Cumulative	Cumulative	Sewer Size Reqd	Sewer Size Required	
12,822		District	Population	Population	Flow- ADF	Flow- Peak	@ 2 fps ADF	@ 2 fps- Peak Flow	
		67	**12,822**	5,000	1,666,860	5,000,580	15	27	21
		VA	**7,822**		1,016,860	3,050,580	12	21	
		66	**7,822**	3,000	1,016,860	3,050,580	12	21	
		119	**4,822**	400	626,860	1,880,580	9	16	
		65	**4,422**	1,640	574,860	1,724,580	9	16	
		64	**2,782**	700	361,660	1,084,980	7	12	
		123	**2,082**	725	270,660	811,980	6	11	
		86	**1,357**	1,357	176,410	529,230	5	9	

8,095

East Fork Drainage System	Cumulative	2050 District	Cumulative	Cumulative			
District	Population	Population	Flow- ADF	Flow- Peak			
65	8,095	820	1,052,350	3,157,050	12	21	
120	7,275	750	945,750	2,837,250	12	20	
64	6,525	2,800	848,250	2,544,750	11	19	
123	3,725	725	484,250	1,452,750	8	14	
121	3,000	1,000	390,000	1,170,000	7	13	
122	2,000	2,000	260,000	780,000	6	11	

7,232

	Cumulative	2050 District	Cumulative	Cumulative			
Northern Collection System	Population	Population	Flow- ADF	Flow- Peak			
105	5,832	250	758,160	2,274,480	10	18	
107	5,582	1,250	725,660	2,176,980	10	18	
109	4,332	176	563,160	1,689,480	9	15	
110	4,156	226	540,280	1,620,840	9	15	
125	3,930	250	510,900	1,532,700	9	15	
115	3,680	750	478,400	1,435,200	8	14	
112	2,930	200	380,900	1,142,700	7	13	
113	2,730	250	354,900	1,064,700	7	12	
114	2,480	130	322,400	967,200	7	12	
111	2,350	2,000	305,500	916,500	7	11	
117	1,400	1,400	182,000	546,000	5	9	
116	350	350	45,500	136,500	3	4	

10,275

	Cumulative	2050 District	Cumulative	Cumulative			
Sulfur Springs Rd Sewer System	Population	Population	Flow- ADF	Flow- Peak			
104	10,275	4,000	1,335,750	4,007,250	14	24	
107	6,275	1,250	815,750	2,447,250	11	19	
108	5,025	525	653,250	1,959,750	10	17	
66	4,500	3,000	585,000	1,755,000	9	16	
118	1,500	1,100	195,000	585,000	5	9	
119	400	400	52,000	156,000	3	5	

97,191

	Cumulative	2050 District	Cumulative	Cumulative			
Overall Creek Sewer System	Population	Population	Flow- ADF	Flow- Peak			
105	97,191	250	12,634,830	37,904,490	42	73	
68	96,941	2,300	12,602,330	37,806,990	42	73	
73	94,641	700	12,303,330	36,909,990	42	72	
74	93,941	750	12,212,330	36,636,990	42	72	
106	93,191	397	12,114,830	36,344,490	41	72	
103	92,794	1,200	12,063,220	36,189,660	41	72	
101	91,594	6,828	11,907,220	35,721,660	41	71	
100	84,766	4,184	11,019,564	33,058,691	40	68	
96	80,582	4,184	10,475,595	31,426,785	39	67	
97	76,397	8,369	9,931,626	29,794,879	38	65	
Stewart Creek	68,028	15,000	8,843,689	26,531,066	35	61	
91	53,028	8,369	6,893,689	20,681,066	31	54	
93	44,660	29,291	5,805,751	17,417,254	29	50	
89	15,369	6,000	1,997,970	5,993,910	17	29	
92	9,369	8,369	1,217,970	3,653,910	13	23	
90	1,000	1,000	130,000	390,000	4	7	

15,000

	Cumulative	2050 District	Cumulative	Cumulative			
Stewart Creek Sewer System	Population	Population	Flow- ADF	Flow- Peak			
102	15,000	6,000	1,950,000	5,850,000	17	29	
99	9,000	3,200	1,170,000	3,510,000	13	22	
98	5,800	1,800	754,000	2,262,000	10	18	
94	4,000	1,700	520,000	1,560,000	9	15	
95	2,300	2,300	299,000	897,000	7	11	

Interceptor	Size (in)	Capacity (mgd)	Year Built	Pipeline Material	Current Pop. Served	Current* ADF	Current* WWPF	2020 Pop. Served	2020 ADF	2020 WWPF	Additional Line Reqd	2050 Pop. Served	2050 ADF	2050 WWPF	Additional Line Reqd @ 2 fps	Additional Line Proposed	Estimated Project Cost	
Sinking Creek	30	11.9	1969	VCP	32,528	4,228,635	12,685,904	48,439	6,297,015	18,891,045	31	73,112	9,504,560	28,513,680	49	42	$8,664,240.00	x
Bushman Creek	18	3.3	1972	RCP	11,279	1,466,235	4,398,704	20,426	2,655,315	7,965,945	26	38,165	4,961,450	14,884,350	41	21	$12,248,340.00	x
Northeast	18	3.3	1976	RCP	5,830	757,896	2,273,688	8,500	1,105,000	3,315,000	1	10,425	1,355,250	4,065,750	10	18	$2,826,720.00	x
VA	21	3	1974	RCP	7,372	958,415	2,875,244	10,298	1,338,750	4,016,250	12	12,822	1,666,860	5,000,580	17	21	$5,337,280.00	
Stones River	42	20.6	1974	RCP	43,035	5,594,574	16,783,722	85,523	11,117,945	33,353,835	43	146,031	18,984,018	56,952,053	72	60	$21,216,000.00	
Lower Lytle	21	3.2	1965	VCP	6,425	835,281	2,505,843	7,418	964,400	2,893,200	-	8,050	1,046,500	3,139,500	-	18	$7,974,720.00	
Lower Lytle-2	30	6.5	1965	VCP	13,183	1,713,840	5,141,519	22,084	2,870,860	8,612,580	17	44,011	5,721,430	17,164,290	39	48		
Upper Lytle	30	6.5	1965	VCP		293,890	881,670	8,945	1,162,910	3,488,730	-	30,771	4,000,230	12,000,690	28	48	$14,523,600.00	
Bradyville Rd	24	4.6	1965	VCP	9,848	1,107,399	3,322,196	11,565	1,503,450	4,510,350	-	12,490	1,623,700	4,871,100	6		$2,920,320.00	
Stones River Ext	30	6.5	1981	RCP	19,049	2,383,477	7,150,431	50,842	6,609,505	19,828,515	43	88,805	11,544,658	34,633,973	63	48	*	
Southwest	21	3.2	1974	RCP	18,331	1,674,936	5,024,808	49,912	6,488,605	19,465,815	48	87,660	11,395,808	34,187,423	66	48	$22,361,040.00	
Southwest Relief	18	2.3	1985	RCP	11,633	1,512,268	4,536,804	35,816	4,656,105	13,968,315	41	69,778	9,071,108	27,213,323	59	36	**	
Samsonite Relief	21	4	1972	RCP	5,328	692,626	2,077,879	11,362	1,477,000	4,431,000	8	16,282	2,116,700	6,350,100	18			
Overall Creek	36	16.5	1999	PVC	1,063	138,184	414,551	44,223	5,749,023	17,247,068	10	97,191	12,634,830	37,904,490	55			
															TOTAL		**$98,072,260.00**	

***FLOWS CALCULATED FROM TRIBUTARY POPULATION**

* Included In Stones River Int.

** Included in Southwest Int.

FUTURE INTERCEPTORS							
Interceptor	2020 Pop. Served	2020 ADF	2020 WWPF	2050 Pop. Served	2050 ADF	2050 WWPF	Estimated Const. Cost
Elam Rd/ Buchanan Rd	23,829	3,097,770	9,293,310	45,648	5,934,240	17,802,720	$7,254,130.00
Salem/ Barfield	14,570	1,894,100	5,682,300	24,284	3,156,920	9,470,760	$9,792,640.00
US 41/ I 840	4,852	630,760	1,892,280	8,576	1,114,880	3,344,640	$7,382,440.00
Sulphur Springs	4,846	629,980	1,889,940	10,403	1,352,390	4,057,170	$2,721,420.00
Stewart Creek	1,833	238,290	714,870	6,634	862,420	2,587,260	$7,116,200.00
Northern Int.	502	65,260	195,780	3,178	413,140	1,239,420	$22,419,540.00
East Fork Int.	3,890	505,700	1,517,100	5,520	717,600	2,152,800	$13,564,980.00
Walter Hill	1,500	195,000	585,000	4,340	564,200	1,692,600	$3,608,800.00
Overall Cr/ Puckett Cr.	42,774	5,560,620	16,681,860	87,222	11,338,860	34,016,580	$15,348,580.00
Miscellaneous	500	65,000	195,000	1,000	130,000	390,000	$6,924,970.00
TOTAL							**$96,133,700.00**

Interceptor	Size	Slope	Capacity	Current Pop. Served	Current* ADF	Current* WWPF	2020 Pop. Served	2020 ADF	2020 WWPF	Additional Line Reqd @ 2fps	Additional Line Reqd @ S	2050 Pop. Served	2050 ADF	2050 WWPF	Additional Line Reqd @ 2 fps	Additional Line Reqd @ S	Additional Line Proposed	Estimated Const. Cost
Sinking Creek																		$8,664,240.00
From Junction Box at WWTP to Thompson Lane	30	0.2	11.9	32,528	4,228,635	12,685,904	48,439	6,297,015	18,891,045	32	25	73,112	9,504,560	28,513,680	49	34	36	
From Thompson Lane to Sulphur Springs Road	27	0.2	9.0	24,508	3,186,071	9,558,213	37,441	4,867,265	14,601,795	28	23	59,590	7,746,700	23,240,100	45	32	30	
From Sulphur Springs Road to Maitland	24	0.2	6.5	10,376	1,348,915	4,046,746	13,825	1,797,250	5,391,750	-	-	17,975	2,336,750	7,010,250	8	9	21	
From Maitland to Bell Street	21	0.15	4.0	7,032	914,154	2,742,461	10,100	1,313,000	3,939,000	-	-	13,700	1,781,000	5,343,000	14	14	18	
From Bell Street to College Road	18	0.2	3.0	4,554	592,020	1,776,060	7,500	975,000	2,925,000	-	-	11,000	1,430,000	4,290,000	13	13	18	
Above College Road	12	0.4	1.5	4,554	592,020	1,776,060	7,500	975,000	2,925,000	14	12		-	-	-	N/A	18	
Bushman Creek																		$12,248,340.00
Sinking Creek Interceptor to U. S. 231	27	0.26	10.2	11,279	1,466,235	4,398,704	20,426	2,655,315	7,965,945	-	-	38,165	4,961,450	14,884,350	26	20		
U. S. 231 to N.E. Interceptor	27	0.24	9.8	8,289	1,077,568	3,232,705	16,326	2,122,315	6,366,945	-	-	34,065	4,428,450	13,285,350	22	18	18	
Above N.E. Interceptor	15	0.6	3.2	2,459	319,672	959,017	7,826	1,017,315	3,051,945	-	-	23,640	3,073,200	9,219,600	29	19		
Northeast																		$2,826,720.00
Bushman Creek Interceptor to Northfield Blvd.	18	0.18	2.9	5,830	757,896	2,273,688	8,500	1,105,000	3,315,000	8	9	10,425	1,355,250	4,065,750	13	13	18	
Above Northfield Blvd.	12	0.22	1.1	5,218	678,310	2,034,930	7,400	962,000	2,886,000	16	15	9,125	1,186,250	3,558,750	19	16	18	
VA																		$5,337,280.00
From Sinking Creek Interceptor to Thompson Lane P.S.	21	0.7	8.6	7,372	958,415	2,875,244	10,298	1,338,750	4,016,250	-	-	12,822	1,666,860	5,000,580	-	N/A	-	
From Thompson Lane P.S. to U.S. 231	18	0.2	3.0	7,372	958,415	2,875,244	10,298	1,338,750	4,016,250	12	12	12,822	1,666,860	5,000,580	17	15	18	
PS V7 to PS C Force Main	18	0.2	3.0	2,310	300,312	900,935	3,875	503,750	1,511,250	-	-	7,822	1,016,860	3,050,580	1	2	-	
PS C to PC B Force Main	15	0.4	2.6	1,409	183,208	549,623	2,375	308,750	926,250	-	-	4,422	574,860	1,724,580	-	N/A	-	
PS B to PS A Force Main	12	1.04	2.4	811	105,385	316,154	1,075	139,750	419,250	-	-	2,782	361,660	1,084,980	-	N/A	-	
Stones River																		$21,216,000.00
Plant to Old Broad Street Plant Site	42	0.1	20.6	43,035	5,594,574	16,783,722	85,523	11,117,945	33,353,835	43	35	146,031	18,984,018	56,952,053	72	52	60	
Old Broad Street Plant Site to Ridgely Road	**	0.07	18.9	41,997	5,459,572	16,378,717	83,650	10,874,445	32,623,335	44	38	143,952	18,713,768	56,141,303	73	56	60	
Lower Lytle	21	0.7	3.2	6,425	835,281	2,505,843	7,418	964,400	2,893,200	-	-	8,050	1,046,500	3,139,500	-	N/A	18	
Lower Lytle-2																		$7,974,720.00
Ridgely Road to Main and Broad Streets	30	0.06	6.5	13,183	1,713,840	5,141,519	22,084	2,870,860	8,612,580	17	20	44,011	5,721,430	17,164,290	39	36	36	
Main and Broad Streets to Church Street	30	0.06	6.5	12,545	1,630,877	4,892,630	21,118	2,745,360	8,236,080	16	18	43,611	5,669,430	17,008,290	39	36	36	
Upper Lytle																		$14,523,600.00
Church and Broad to Church and Rushwood	15	0.11	1.4	2,261	293,890	881,670	8,945	1,162,910	3,488,730	17	17	30,771	4,000,230	12,000,690	39	32	30	
Church and Rushwood to Sanbyrn Drive	12	0.15	0.9	2,146	278,934	836,801	8,795	1,143,410	3,430,230	19	18	30,546	3,970,980	11,912,940	40	31	30	
Above Sanbyrn Drive	21	0.1	3.2	2,035	264,563	793,690	8,642	1,123,410	3,370,230	4	6	30,546	3,970,980	11,912,940	35	30	30	

Interceptor	Size	Slope	Capacity	Current Pop. Served	Current* ADF	Current* WWPF	2020 Pop. Served	2020 ADF	2020 WWPF	Additional Line Reqd @ 2fps	Additional Line Reqd @ S	2050 Pop. Served	2050 ADF	2050 WWPF	Additional Line Reqd @ 2 fps	Additional Line Reqd @ S	Additional Line Proposed	Estimated Const. Cost
Bradyville Rd																		$2,920,320.00
Church Street to Manchester Pike	24	0.1	4.6	9,848	1,280,221	3,840,662	11,565	1,503,450	4,510,350	-	-	12,490	1,623,700	4,871,100	6	8	18	
Manchester Pike to Bradyville Road Diversion Station	18	0.12	2.4	7,027	913,528	2,740,585	8,215	1,067,950	3,203,850	11	12	8,715	1,132,950	3,398,850	12	13	18	
Bradyville Road Diversion Station to Minerva Drive	18	0.16	2.7	1,529	198,834	596,501	1,715	222,950	668,850	-	-	1,915	248,950	746,850	-	N/A		
Stones River Ext	30	0.2	6.5	19,049	2,476,371	7,429,112	50,842	6,609,505	19,828,515	43	31	88,805	11,544,658	34,633,973	63	41	42	*
Southwest																		$22,361,040.00
Ridgely Road to Screw Lift Pump Station	21	0.7	16.1	18,334	2,383,477	7,150,431	49,942	6,492,505	19,477,515	22	15	87,730	11,404,908	34,214,723	51	28	48	
Screw Lift Pump Station to Malloy Lane	21	0.2	4.6	18,226	2,369,382	7,108,147	49,462	6,430,105	19,290,315	46	32	87,060	11,317,808	33,953,423	65	42	48	
Malloy Lane to End of Line above I-24	21	0.1	3.2	12,884	1,674,936	5,024,808	37,947	4,933,105	14,799,315	40	34	70,778	9,201,108	27,603,323	59	45	48	
I-24 to State Route 99	18	0.12	2.4	6,840	889,181	2,667,544	23,266	3,024,605	9,073,815	31	27	50,678	6,588,108	19,764,323	50	38	42	
State Route 99 to PS R8 Force Main	18	0.12	2.4	6,639	863,025	2,589,076	22,966	2,985,605	8,956,815	31	26	50,278	6,536,108	19,608,323	49	38	42	
Pumping Station R8 to River Crossing	18	0.3	3.7	5,635	732,525	2,197,575	21,466	2,790,605	8,371,815	26	20	48,528	6,308,608	18,925,823	46	30	36	
River Crossing to Hwy 231	12	0.22	1.1	2,977	386,980	1,160,940	14,441	1,877,355	5,632,065	25	21	31,834	4,138,388	12,415,163	40	29	36	
Hwy 231 to End of Existing Line	12	0.22	1.1	1,101	143,130	429,390	12,134	1,577,355	4,732,065	23	19	31,834	4,138,388	12,415,163	40	29	30	
Southwest Relief	18	0.1	2.3	11,633	1,512,268	4,536,804	35,816	4,656,105	13,968,315	41	34	69,778	9,071,108	27,213,323	59	45	36	**
Samsonite Relief																		
From Southwest Interceptor to Midpoint of Malloy Lane	21	0.16	4.1	5,328	692,626	2,077,879	11,362	1,477,000	4,431,000	7	8	16,282	2,116,700	6,350,100	18	17		
From Midpoint of Malloy Lane to Samsonite Blvd. West of Rutl	21	0.1	3.2	2,419	314,447	943,340	4,115	535,000	1,605,000	-	-	5,900	767,000	2,301,000	-	N/A		
Above Samsonite Blvd.	15	0.16	1.7	2,389	310,620	931,859	3,692	480,000	1,440,000	-	-	5,154	670,000	2,010,000	7	8		
Overall Creek																		
From Overall Creek Pump Station to below Asbury Rd.	36	0.07	14.8	1,063	138,184	414,551	44,223	5,749,023	17,247,068	18	20	97,191	12,634,830	37,904,490	57	47		
From below Asbury Rd. to below Mason Pk.	24	0.13	6.9	636	82,720	248,159	37,401	4,862,179	14,586,536	33	28	84,766	11,019,564	33,058,691	61	44		
From below Mason Pike to Puckett Creek Interceptor	21	0.15	5.2	560	72,793	218,378	37,820	4,916,576	14,749,727	37	29	84,766	11,019,564	33,058,691	63	44		
From joint at Puckett Creek Interceptor to Highway 96	18	0.18	3.7	403	52,415	157,245	26,989	3,508,513	10,525,539	31	25	61,028	7,933,689	23,801,066	53	37		
From Highway 96 to Windrow Road	15	0.19	2.4	141	18,286	54,858	9,206	1,196,748	3,590,243	13	13	16,738	2,175,908	6,527,723	24	20		
Puckett Creek					-	-		-	-	-	-		-	-	-	N/A		
Above Highway 96	21	0.28	7.1	157	20,378	61,133	12,505	1,625,666	4,876,999	-	-	27,922	3,629,876	10,889,629	23	18		
From below Highway 96 to Highway 99	18	0.16	3.5	-	-	-	9,995	1,299,285	3,897,855	7	8	23,738	3,085,908	9,257,723	28	24		

$98,072,260.00

* Included In Stones River Int.

** Included in Southwest Int.

APPENDIX D

ESTIMATED CONSTRUCTION COSTS OF PROPOSED IMPROVEMENTS

Project Name	PROJECT PRIORITY	IMPROVEMENT NUMBER	QUANTITY		SIZE	UNIT COST ($)	CONSTRUCTION COST ($)	SHORT RANGE	MEDIUM RANGE	LONG RANGE
NORTHWEST QUADRANT										
Stones Riv.	2	53-1 PUMP STATION			20 MGD	300000.00	6,000,000	-	6,000,000	-
Sulfur Spr.	3	68-1 FORCE MAIN	3,000	LF	10 INCH	50.00	150,000	-	-	150,000
Sulfur Spr.	3	68-2 PUMP STATION			1.0 MGD	600000.00	600,000	-	-	600,000
Sulfur Spr.	3	68-3 GRAVITY SEWER	2,400	LF	15 INCH	120.00	288,000	-	-	288,000
Sulfur Spr.	3	68-4 GRAVITY SEWER	3,800	LF	12 INCH	96.00	364,800	-	-	364,800
Sulfur Spr.	3	68-5 GRAVITY SEWER	4,100	LF	12 INCH	96.00	393,600	-	-	393,600
Sinking Cr. I	1	69-1 GRAVITY SEWER	3,300	LF	36 INCH	288.00	950,400	950,400	-	-
Sinking Cr. II	2	69-2 GRAVITY SEWER	9,500	LF	30 INCH	240.00	2,280,000	-	2,280,000	-
Stones Riv.	2	75-1 GRAVITY SEWER	21,500	LF	60 INCH	480.00	10,320,000	-	10,320,000	-
US41/ I840	2	A-2 GRAVITY SEWER	3,000	LF	48 INCH	384.00	1,152,000	-	1,152,000	-
US41/ I840	2	C-1 FORCE MAIN	3,000	LF	12 INCH	96.00	288,000	-	288,000	-
US41/ I840	2	C-2 GRAVITY SEWER	4,000	LF	15 INCH	120.00	480,000	-	480,000	-
US41/ I840	2	C-3 GRAVITY SEWER	4,000	LF	12 INCH	96.00	384,000	-	384,000	-
Northern Int	3	J-1 PUMP STATION			3.0 MGD	600000.00	1,800,000	-	-	1,800,000
Northern Int	3	J-2 GRAVITY SEWER	4,100	LF	12 INCH	96.00	393,600	-	-	393,600
Northern Int	3	J-3 FORCE MAIN	6,000	LF	20 INCH	100.00	600,000	-	-	600,000
US41/ I840	2	K-1 FORCE MAIN	9,800	LF	10 INCH	50.00	490,000	-	490,000	-
US41/ I840	2	K-2 PUMP STATION			0.9 MGD	600000.00	540,000	-	540,000	-
US41/ I840	2	K-3 GRAVITY SEWER	9,300	LF	12 INCH	96.00	892,800	-	892,800	-
US41/ I840	2	L-1 GRAVITY SEWER	12,000	LF	12 INCH	96.00	1,152,000	-	1,152,000	-
US41/ I840	2	L-2 PUMP STATION			0.5 MGD	600000.00	300,000	-	300,000	-
Northern Int	3	NC-1 FORCE MAIN	2,500	LF	12 INCH	60.00	150,000	-	-	150,000
Northern Int	3	NC-2 PUMP STATION			1.4 MGD	600000.00	840,000	-	-	840,000
Northern Int	3	NC-3 GRAVITY SEWER	3,400	LF	12 INCH	96.00	326,400	-	-	326,400
Northern Int	3	NC1-1 FORCE MAIN	3,500	LF	8 INCH	40.00	140,000	-	-	140,000
Northern Int	3	NC1-2 PUMP STATION			0.5 MGD	600000.00	300,000	-	-	300,000
Northern Int	3	ND-1 FORCE MAIN	3,500	LF	12 INCH	60.00	210,000	-	-	210,000
Northern Int	3	ND-2 PUMP STATION			1.2 MGD	600000.00	720,000	-	-	720,000
Northern Int	3	ND1-1 FORCE MAIN	4,000	LF	12 INCH	60.00	240,000	-	-	240,000
Northern Int	3	ND1-2 PUMP STATION			1.7 MGD	600000.00	1,020,000	-	-	1,020,000
Northern Int	3	ND1-3 GRAVITY SEWER	2,300	LF	15 INCH	120.00	276,000	-	-	276,000
Northern Int	3	ND1-4 GRAVITY SEWER	4,000	LF	8 INCH	64.00	256,000	-	-	256,000
Northern Int	3	ND2-1 FORCE MAIN	4,500	LF	10 INCH	50.00	225,000	-	-	225,000
Northern Int	3	ND2-2 PUMP STATION			0.9 MGD	600000.00	540,000	-	-	540,000
Northern Int	3	NE-1 FORCE MAIN	1,800	LF	16 INCH	80.00	144,000	-	-	144,000
Northern Int	3	NE-2 PUMP STATION			2.5 MGD	600000.00	1,500,000	-	-	1,500,000
Northern Int	3	NE-3 GRAVITY SEWER	3,800	LF	15 INCH	120.00	456,000	-	-	456,000
Northern Int	3	NE-4 GRAVITY SEWER	4,000	LF	15 INCH	120.00	480,000	-	-	480,000
Northern Int	3	NE1-1 FORCE MAIN	1,500	LF	6 INCH	30.00	45,000	-	-	45,000
Northern Int	3	NE1-2 PUMP STATION			0.3 MGD	600000.00	180,000	-	-	180,000
Northern Int	3	NE1-3 GRAVITY SEWER	3,000	LF	8 INCH	64.00	192,000	-	-	192,000
Northern Int	3	NF-1 FORCE MAIN	2,500	LF	20 INCH	100.00	250,000	-	-	250,000
Northern Int	3	NF-2 PUMP STATION			3.0 MGD	600000.00	1,800,000	-	-	1,800,000
Northern Int	3	NF-3 GRAVITY SEWER	8,000	LF	12 INCH	96.00	768,000	-	-	768,000
Northern Int	3	NF-4 GRAVITY SEWER	7,200	LF	18 INCH	144.00	1,036,800	-	-	1,036,800
Sulfur Spr.	3	NH-1 FORCE MAIN	3,500	LF	6 INCH	30.00	105,000	-	-	105,000
Sulfur Spr.	3	NH-2 PUMP STATION			0.3 MGD	600000.00	192,000	-	-	192,000
								-	-	-
					SUBTOTAL		$42,211,400	$950,400	$24,278,800	$16,982,200

Project Name	PROJECT PRIORITY	IMPROVEMENT NUMBER	QUANTITY		SIZE	UNIT COST ($)	CONSTRUCTION COST ($)	SHORT RANGE	MEDIUM RANGE	LONG RANGE
NORTHEAST QUADRANT										
NE Int	2	59-1 GRAVITY SEWER	6,500	LF	18 INCH	144.00	936,000	-	936,000	-
Bushman Cr I	1	60-1 FORCE MAIN	3,800	LF	20 INCH	90.00	339,100	339,100	-	-
Bushman Cr I	1	60-2 PUMP STATION			5.0 MGD	497340.00	2,486,700	2,486,700	-	-
East Fork Int	3	64-1 GRAVITY SEWER	7,300	LF	12 INCH	96.00	700,800	-	-	700,800
East Fork Int	3	64-2 FORCE MAIN	5,900	LF	12 INCH	60.00	354,000	-	-	354,000
East Fork Int	3	64-3 PUMP STATION			1.0 MGD	600000.00	600,000	-	-	600,000
East Fork Int	3	64-4 GRAVITY SEWER	4,200	LF	10 INCH	80.00	336,000	-	-	336,000
East Fork Int	3	64A-1 FORCE MAIN	3,500	LF	12 INCH	60.00	210,000	-	-	210,000
East Fork Int	3	64A-2 PUMP STATION			0.9 MGD	600000.00	540,000	-	-	540,000
East Fork Int	3	64A-3 GRAVITY SEWER	9,500	LF	12 INCH	96.00	912,000	-	-	912,000
East Fork Int	3	64B-1 FORCE MAIN	6,800	LF	8 INCH	40.00	272,000	-	-	272,000
East Fork Int	3	64B-2 PUMP STATION			0.3 MGD	600000.00	180,000	-	-	180,000
East Fork Int	3	64B-3 GRAVITY SEWER	3,800	LF	10 INCH	80.00	304,000	-	-	304,000
Miscellaneous	1	65-1 GRAVITY SEWER	2,955	LF	12 INCH	98.95	292,400	292,400	-	-
East Fork Int	3	65-2 GRAVITY SEWER	6,500	LF	15 INCH	120.00	780,000	-	-	780,000
East Fork Int	3	65-3 FORCE MAIN	4,400	LF	12 INCH	60.00	264,000	-	-	264,000
East Fork Int	3	65-4 PUMP STATION			1.3 MGD	600000.00	780,000	-	-	780,000
East Fork Int	3	65-5 GRAVITY SEWER	4,100	LF	10 INCH	80.00	328,000	-	-	328,000
East Fork Int	3	65-6 FORCE MAIN	3,400	LF	12 INCH	60.00	204,000	-	-	204,000
East Fork Int	3	65-7 PUMP STATION			1.2 MGD	600000.00	720,000	-	-	720,000
Bushman Cr II	2	65-8 GRAVITY SEWER	2,800	LF	18 INCH	144.00	403,200	-	403,200	-
Walter Hill	3	66-1 GRAVITY SEWER	3,000	LF	10 INCH	80.00	240,000	-	-	240,000
Walter Hill	3	66-2 PUMP STATION			0.8 MGD	600000.00	480,000	-	-	480,000
Walter Hill	3	66-3 FORCE MAIN	7,000	LF	12 INCH	60.00	420,000	-	-	420,000
East Fork Int	3	66-4 GRAVITY SEWER	3,400	LF	18 INCH	144.00	489,600	-	-	489,600
VA Int	2	67-1 PUMP STATION			4 MGD	600000.00	2,400,000	-	2,400,000	-
VA Int	2	67-2 GRAVITY SEWER	9,200	LF	21 INCH	168.00	1,545,600	-	1,545,600	-
VA Int	2	67-3 GRAVITY SEWER	2,000	LF	10 INCH	80.00	160,000	-	160,000	-
Walter Hill	3	NA-1 FORCE MAIN	3,000	LF	8 INCH	100.00	300,000	-	-	300,000
Walter Hill	3	NA-2 PUMP STATION			0.5 MGD	600000.00	300,000	-	-	300,000
Walter Hill	3	NA-3 GRAVITY SEWER	6,300	LF	10 INCH	80.00	504,000	-	-	504,000
Walter Hill	3	NA1-1 FORCE MAIN	1,000	LF	8 INCH	40.00	40,000	-	-	40,000
Walter Hill	3	NA1-2 PUMP STATION			0.3 MGD	600000.00	180,000	-	-	180,000
Walter Hill	3	NA1-3 GRAVITY SEWER	3,900	LF	10 INCH	80.00	312,000	-	-	312,000
East Fork Int	3	NA2-1 FORCE MAIN	5,000	LF	8 INCH	40.00	200,000	-	-	200,000
East Fork Int	3	NA2-2 PUMP STATION			0.5 MGD	600000.00	300,000	-	-	300,000
East Fork Int	3	NA2-3 GRAVITY SEWER	5,000	LF	10 INCH	80.00	400,000	-	-	400,000
East Fork Int	3	NA3-1 FORCE MAIN	1,500	LF	10 INCH	50.00	75,000	-	-	75,000
East Fork Int	3	NA3-2 PUMP STATION			0.75 MGD	600000.00	450,000	-	-	450,000
East Fork Int	3	NA3-3 GRAVITY SEWER	6,200	LF	12 INCH	96.00	595,200	-	-	595,200
East Fork Int	3	NA4-1 FORCE MAIN	3,500	LF	8 INCH	40.00	140,000	-	-	140,000
East Fork Int	3	NA4-2 PUMP STATION			0.5 MGD	600000.00	300,000	-	-	300,000
Northern Int	3	NB-1 FORCE MAIN	2,000	LF	10 INCH	50.00	100,000	-	-	100,000
Northern Int	3	NB-2 PUMP STATION			0.8 MGD	600000.00	480,000	-	-	480,000
Miscellaneous	1	NB1-1 FORCE MAIN	11,000	LF	6 INCH	30.00	330,000	330,000	-	-
Miscellaneous	1	NB1-2 PUMP STATION			0.3 MGD	600000.00	180,000	180,000	-	-
Miscellaneous	1	NB1-3 GRAVITY SEWER	3,500	LF	10 INCH	80.00	280,000	280,000	-	-
Miscellaneous	2	99-1 FORCE MAIN	4,600	LF	6 INCH	30.00	138,000	-	138,000	-
Miscellaneous	2	99-2 PUMP STATION			0.2 MGD	600000.00	120,000	-	120,000	-
Miscellaneous	2	99-3 GRAVITY SEWER	4,600	LF	10 INCH	80.00	368,000	-	368,000	-
Northern Int	3	NB2-1 FORCE MAIN	3,000	LF	8 INCH	40.00	120,000	-	-	120,000
Northern Int	3	NB2-2 PUMP STATION			0.6 MGD	600000.00	360,000	-	-	360,000
Northern Int	3	NB2-3 GRAVITY SEWER	11,000	LF	10 INCH	80.00	880,000	-	-	880,000
Northern Int	3	NB3-1 FORCE MAIN	9,900	LF	6 INCH	30.00	297,000	-	-	297,000
Northern Int	3	NB3-2 PUMP STATION			0.2 MGD	600000.00	120,000	-	-	120,000
								-	-	-
					SUBTOTAL		$25,546,600	3,908,200	6,070,800	15,567,600

Project Name	PROJECT PRIORITY	IMPROVEMENT NUMBER	QUANTITY		SIZE	UNIT COST ($)	CONSTRUCTION COST ($)	SHORT RANGE	MEDIUM RANGE	LONG RANGE
SOUTHWEST QUADRANT										
SW Int. I	1	38-1 GRAVITY SEWER	3,500	LF	42 INCH	336.00	1,176,000	1,176,000	-	-
SW Int. I	1	43-1 GRAVITY SEWER	3,900	LF	48 INCH	384.00	1,497,600	1,497,600	-	-
SW Int. I	1	44-1 GRAVITY SEWER	3,900	LF	48 INCH	384.00	1,497,600	1,497,600	-	-
MISCELLANEOUS	2	47-1 GRAVITY SEWER	4,900	LF	12 INCH	96.00	470,400	-	470,400	-
Medical Cntr Pkwy	1	54-1 GRAVITY SEWER	5,900	LF	12 INCH	167.00	985,300	985,300	-	-
Medical Cntr Pkwy	1	54-2 GRAVITY SEWER	3,100	LF	8 INCH	56.00	173,600	173,600	-	-
Medical Cntr Pkwy	1	54-3 GRAVITY SEWER	3,900	LF	8 INCH	56.00	218,400	218,400	-	-
Medical Cntr Pkwy	1	55-1 PUMP STATION			0.5 MGD	300000.00	300,000	300,000	-	-
Medical Cntr Pkwy	1	55-2 FORCE MAIN	3,000	LF	6 INCH	30.00	90,000	90,000	-	-
Medical Cntr Pkwy	1	55-3 GRAVITY SEWER	1,700	LF	10 INCH	80.00	136,000	136,000	-	-
Medical Cntr Pkwy	1	55-4 GRAVITY SEWER	9,200	LF	8 INCH	64.00	588,800	588,800	-	-
Salem/Barfield I	1	71-1 FORCE MAIN	5,500	LF	8 INCH	40.00	220,000	220,000	-	-
Salem/Barfield I	1	71-2 PUMP STATION			1 MGD	450000.00	450,000	450,000	-	-
Salem/Barfield II	2	71-3 GRAVITY SEWER	10,250	LF	12 INCH	96.00	984,000	-	984,000	-
Salem/Barfield IV	3	71-4 GRAVITY SEWER	14,000	LF	12 INCH	96.00	1,344,000	-	-	1,344,000
Salem/Barfield IV	3	71B-1 GRAVITY SEWER	21,000	LF	12 INCH	96.00	2,016,000	-	-	2,016,000
Salem/Barfield I	1	72-1 GRAVITY SEWER	3,450	LF	21 INCH	168.00	579,600	579,600	-	-
Salem/Barfield I	1	72-2 GRAVITY SEWER	1,600	LF	18 INCH	144.00	230,400	230,400	-	-
Salem/Barfield I	1	72-3 GRAVITY SEWER	2,800	LF	15 INCH	120.00	336,000	336,000	-	-
Salem/Barfield I	1	72-4 GRAVITY SEWER	1,700	LF	12 INCH	96.00	163,200	163,200	-	-
Salem/Barfield I	1	72-5 GRAVITY SEWER	4,200	LF	8 INCH	64.00	268,800	268,800	-	-
Salem/Barfield III	2	72-6 GRAVITY SEWER	4,900	LF	24 INCH	192.00	940,800	-	940,800	-
Medical Cntr Pkwy	1	87-1 GRAVITY SEWER	3,400	LF	12 INCH	96.00	326,400	326,400	-	-
Medical Cntr Pkwy	1	87-2 GRAVITY SEWER	2,200	LF	10 INCH	80.00	176,000	176,000	-	-
Medical Cntr Pkwy	1	87-3 GRAVITY SEWER	2,400	LF	8 INCH	64.00	153,600	153,600	-	-
Puckett Cr. II	2	I-1 GRAVITY SEWER	11,500	LF	18 INCH	144.00	1,656,000	-	1,656,000	-
Puckett Cr. IV	3	I-2 GRAVITY SEWER	14,900	LF	18 INCH	144.00	2,145,600	-	-	2,145,600
Stewart Creek	3	E-3 GRAVITY SEWER	8,000	LF	15 INCH	120.00	960,000	-	-	960,000
Overall Cr I	2	F-1 GRAVITY SEWER	19,100	LF	15 INCH	110.00	2,101,000	-	2,101,000	-
Puckett Cr. III	2	H-3 GRAVITY SEWER	3,500	LF	12 INCH	96.00	336,000	-	336,000	-
Puckett Cr. I	1	M-1 GRAVITY SEWER	19,000	LF	18 INCH	144.00	2,736,000	2,736,000	-	-
Puckett Cr. V	3	M-2 GRAVITY SEWER	6,000	LF	18 INCH	144.00	864,000	-	-	864,000
Puckett Cr. V	3	M-3 GRAVITY SEWER	2,000	LF	18 INCH	144.00	288,000	-	-	288,000
Overall Cr V	3	N-1 GRAVITY SEWER	14,000	LF	15 INCH	120.00	1,680,000	-	-	1,680,000
Stewart Creek	3	O-1 GRAVITY SEWER	9,000	LF	12 INCH	96.00	864,000	-	-	864,000
Stewart Creek	3	P-1 GRAVITY SEWER	3,500	LF	8 INCH	64.00	224,000	-	-	224,000
Stewart Creek	3	P-2 PUMP STATION			0.5 MGD	600000.00	300,000	-	-	300,000
Stewart Creek	3	P-3 FORCE MAIN	6,000	LF	6 INCH	30.00	180,000	-	-	180,000
Stewart Creek	3	P-4 GRAVITY SEWER	2,500	LF	8 INCH	64.00	160,000	-	-	160,000
Stewart Creek	3	P-5 PUMP STATION			0.7 MGD	600000.00	420,000	-	-	420,000
Stewart Creek	3	P-6 FORCE MAIN	1,000	LF	8 INCH	40.00	40,000	-	-	40,000
Stewart Creek	3	Q-1 GRAVITY SEWER	7,500	LF	12 INCH	96.00	720,000	-	-	720,000
Stewart Creek	3	Q-2 PUMP STATION			1.3 MGD	600000.00	780,000	-	-	780,000
Stewart Creek	3	Q-3 FORCE MAIN	3,000	LF	12 INCH	60.00	180,000	-	-	180,000
Stewart Creek	3	Q-4 GRAVITY SEWER	4,000	LF	8 INCH	64.00	256,000	-	-	256,000
Stewart Creek	3	Q-5 PUMP STATION			0.5 MGD	600000.00	300,000	-	-	300,000
Stewart Creek	3	Q-6 FORCE MAIN	3,000	LF	6 INCH	30.00	90,000	-	-	90,000
								-	-	-
					SUBTOTAL		$32,603,100	$12,303,300	$6,488,200	$13,811,600

Project Name	PROJECT PRIORITY	IMPROVEMENT NUMBER	QUANTITY		SIZE	UNIT COST ($)	CONSTRUCTION COST ($)	SHORT RANGE	MEDIUM RANGE	LONG RANGE
SOUTHEAST QUADRANT										
Sinking Cr III	2	6-1 GRAVITY SEWER	1,700	LF	18 INCH	144.00	244,800	-	244,800	-
Sinking Cr III	2	8-1 GRAVITY SEWER	1,600	LF	18 INCH	144.00	230,400	-	230,400	-
NE Int	2	9-1 GRAVITY SEWER	8,600	LF	18 INCH	144.00	1,238,400	-	1,238,400	-
Sinking Cr III	2	10-1 GRAVITY SEWER	3,100	LF	18 INCH	144.00	446,400	-	446,400	-
Sinking Cr III	2	12-1 GRAVITY SEWER	2,800	LF	18 INCH	144.00	403,200	-	403,200	-
Sinking Cr III	2	15-1 GRAVITY SEWER	1,900	LF	18 INCH	144.00	273,600	-	273,600	-
Sinking Cr III	2	16-1 GRAVITY SEWER	1,900	LF	18 INCH	144.00	273,600	-	273,600	-
Sinking Cr III	2	16-2 GRAVITY SEWER	2,100	LF	18 INCH	144.00	302,400	-	302,400	-
Bradyville Rd	2	18-1 GRAVITY SEWER	5,200	LF	18 INCH	144.00	748,800	-	748,800	-
Bradyville Rd	1	18-2 GRAVITY SEWER	4,900	LF	18 INCH	144.00	705,600	705,600	-	-
Upper Lytle I	2	21-1 GRAVITY SEWER	7,000	LF	30 INCH	240.00	1,680,000	-	1,680,000	-
Upper Lytle I	2	23-1 GRAVITY SEWER	3,200	LF	30 INCH	240.00	768,000	-	768,000	-
Bradyville Rd	2	24-1 GRAVITY SEWER	5,500	LF	18 INCH	144.00	792,000	-	792,000	-
Lower Lytle I	2	30-1 GRAVITY SEWER	8,800	LF	36 INCH	288.00	2,534,400	-	2,534,400	-
SW Int 1	1	34-1 GRAVITY SEWER	1,700	LF	42 INCH	336.00	571,200	571,200	-	-
SW Int I	1	35-1 PUMP STATION			10 MGD	400000.00	4,000,000	4,000,000	-	-
SW Int I	1	35-2 FORCE MAIN	1,400	LF	20 INCH	100.00	140,000	140,000	-	-
SW Int II	2	35-3 GRAVITY SEWER	2,600	LF	36 INCH	288.00	748,800	-	748,800	-
SW Int I	1	36-1 GRAVITY SEWER	5,900	LF	42 INCH	336.00	1,982,400	1,982,400	-	-
SW Int I	1	52-1 GRAVITY SEWER	3,300	LF	48 INCH	384.00	1,267,200	1,267,200	-	-
Bushman Cr II	2	62-1 GRAVITY SEWER	5,300	LF	21 INCH	168.00	890,400	-	890,400	-
Bushman Cr II	2	62-2 GRAVITY SEWER	1,500	LF	21 INCH	168.00	252,000	-	252,000	-
Bushman Cr II	2	62-3 GRAVITY SEWER	2,000	LF	12 INCH	96.00	192,000	-	192,000	-
Bushman Cr II	2	62-4 FORCE MAIN	2,000	LF	16 INCH	80.00	160,000	-	160,000	-
Bushman Cr II	2	62-5 PUMP STATION			1 MGD	600000.00	600,000	-	600,000	-
Bushman Cr II	2	62-6 GRAVITY SEWER	3,500	LF	21 INCH	168.00	588,000	-	588,000	-
Bushman Cr II	2	62-7 FORCE MAIN	4,000	LF	20 INCH	100.00	400,000	-	400,000	-
Bushman Cr II	2	62-8 GRAVITY SEWER	7,800	LF	21 INCH	168.00	1,310,400	-	1,310,400	-
Bushman Cr II	2	62-9 PUMP STATION			3 MGD	600000.00	1,800,000	-	1,800,000	-
Upper Lytle II	2	63-1 GRAVITY SEWER	11,000	LF	30 INCH	240.00	2,640,000	-	2,640,000	-
Upper Lytle II	2	63-2 GRAVITY SEWER	5,500	LF	30 INCH	240.00	1,320,000	-	1,320,000	-
Upper Lytle II	2	63-3 GRAVITY SEWER	11,000	LF	24 INCH	192.00	2,112,000	-	2,112,000	-
Upper Lytle II	2	63-4 GRAVITY SEWER	3,000	LF	18 INCH	144.00	432,000	-	432,000	-
Upper Lytle II	2	63-5 FORCE MAIN	4,800	LF	10 INCH	50.00	240,000	-	240,000	-
Upper Lytle II	2	63-6 PUMP STATION			1.0 MGD	600000.00	600,000	-	600,000	-
Upper Lytle II	2	63-7 GRAVITY SEWER	11,000	LF	15 INCH	120.00	1,320,000	-	1,320,000	-
Upper Lytle II	2	63B-1 GRAVITY SEWER	6,500	LF	15 INCH	120.00	$780,000	-	780,000	-
Upper Lytle III	3	63B-2 GRAVITY SEWER	12,000	LF	18 INCH	144.00	1,728,000	-	-	1,728,000
SW Int II	2	70-1 GRAVITY SEWER	18,000	LF	30 INCH	240.00	4,320,000	-	4,320,000	-
Elam/Buchanan	1	70-2 GRAVITY SEWER	5,400	LF	18 INCH	144.00	777,600	777,600	-	-
Elam/Buchanan	1	70-3 GRAVITY SEWER	8,500	LF	15 INCH	144.00	1,224,000	1,224,000	-	-
Elam/Buchanan	1	70-4 PUMP STATION			1 MGD	650000.00	650,000	650,000	-	-
Elam/Buchanan	1	70-5 GRAVITY SEWER	2,750	LF	16 INCH	70.00	192,500	192,500	-	-
Elam/Buchanan	1	70B-1 GRAVITY SEWER	19,000	LF	18 INCH	144.00	2,736,000	2,736,000	-	-
Lower Lytle I	2	73-1 GRAVITY SEWER	3,000	LF	48 INCH	384.00	1,152,000	-	1,152,000	-
Sinking Cr III	2	81-1 GRAVITY SEWER	7,500	LF	21 INCH	168.00	1,260,000	-	1,260,000	-
					SUBTOTAL		49,028,100	14,246,500	33,053,600	1,728,000
		TOTAL ESTIMATED CONSTRUCTION COST					$149,389,200	$31,408,400	$69,891,400	$48,089,400
		ESTIMATED LEGAL, ENGINEERING, ADMINISTRATIVE, AND EASEMENTS, etc. @ 30%					$44,816,760	$9,422,520	$20,967,420	$14,426,820
		TOTAL ESTIMATED CAPITAL COST					$194,205,960	$40,830,920	$90,858,820	$62,516,220

IMPROVEMENTS INDICATED BY SHADING ARE HIGH PRIORITY PROJECTS

APPENDIX E

MINUTES FROM PUBLIC HEARING ON MARCH 12, 2002

MINUTES
MURFREESBORO WATER AND SEWER BOARD
MARCH 12, 2002

The Murfreesboro Water and Sewer Board met on March 12, 2002 in the conference room at the Operations and Maintenance Facility at 1725 South Church Street. Present at the meeting were Board members: Clay Beach, Gary Brown, Al Carter, Tim Durham, Toby Gilley, Andrea Loughry and Don Moser. Also present were Gene Casto, Joe Kirchner, Valerie Smith, Bobby Worthington, Terry Taylor, Susan McGannon, Kenny Diehl, Mike Bernard, Doug Demosi, Ronnie Blanton, John Callow with DNJ and members of the public.

A motion was made by Mr. Brown and seconded by Mr. Gilley to elect Ms. Valerie Smith to the position of Secretary for the Board.

The motion carried by the following vote:

Mr. Beach – Aye
Mr. Brown – Aye
Dr. Carter – Aye
Mr. Durham – Aye
Mr. Gilley – Aye
Ms. Loughry – Aye
Mr. Moser – Aye

The minutes of the February 5, 2002 meeting were presented for corrections and/or deletions. Ms. Susan McGannon made a request for correction, adding the grease trap policy to the minutes, prior to the meeting and revised minutes were handed out to the board members. A motion was made by Mr. Durham and seconded by Mr. Beach to approve the minutes as corrected.

The motion carried by the following vote:

Mr. Brown – Aye
Mr. Beach - Aye
Dr. Carter – Aye
Mr. Durham – Aye
Mr. Gilley – Aye
Ms. Loughry – Aye
Mr. Moser – Aye

Next, the Board conducted a public hearing regarding the Murfreesboro Wastewater Facilities Plan, 2002 Revision. The minutes of this hearing were transcribed by: Marilyn Gorski, CCR #0174 and are as follows:

INDEX OF SPEAKERS

MR. MOSER: Good evening, I'm Don Moser, chairman of the Murfreesboro Water and Sewer Board. We are pleased to have you with us this evening.

Is everybody signed in? We've got a sheet up back there that if you haven't, we would like for you to sign in, please.

At this time, I would like to call the meeting to order. The first thing on the agenda, we need a new secretary. And we have Valerie Smith down here who has been acting as our secretary, but we need to officially appoint her as secretary, and we need a motion.

(Motion was made and seconded.)

MR. MOSER: Would you please call the roll, please?

(The roll was called and all members answered aye.)

MR. MOSER: Thank you. Now we officially have a secretary.

The next thing on the agenda is to consider the minutes of the February 5, 2002, meeting.

MR. KIRCHNER: I did lay a corrected copy in front of you. On Page 3 in green, you'll see we added where we insert there a copy of the grease trap policy. So it's included in the minutes.

MR. MOSER: On Page 3 right above where it says "security", we did insert the grease trap policy as a part of this. Motion and seconds to approve the minutes.

(Motion to approve the minutes was made and seconded, and all members answered aye.)

MR. MOSER: At this time, we would like to now start our meeting, our 201 waste facilities plan, and I would like to introduce to you Mr. Kenny Diehl with the firm of Smith, Seckman, and Reid.

MR. DIEHL: Thank you, Mr. Moser. What we're going to do tonight is I'm going to start out by reading a narrative statement. Copies are available. This is some of the things that need to be done for us to follow the rules of the public hearing.

Then I will be making a power point presentation which will be the recommended plan from the 201 facilities plan that the department has been looking at.

Finally, we will take questions from anyone of you or statements that you want it make. We would respectfully ask that you wait until the end for questions. We've provided index cards back here on the table so that you can write down your questions so that you won't forget them. And if you would, please, put your name on the index cards so we can attribute them to the right person. We would appreciate it.

To begin with the narrative statement, the purpose of this hearing is to give information and solicit public comment -- excuse me. I'm at that age where I have to change out -- on the city of Murfreesboro's 2002 update to its 201 facilities plan.

The existing 201 facilities plan was completed in 1992 and included an area encompassing approximately 180 square miles within Rutherford County.

The 1101 regional growth boundary, i.e., the urban growth boundary or UGB, expanded the planning area for the city of Murfreesboro to approximately 205 square miles.

For the purposes of the 201 facilities plan update of 2002, the planning area includes all of the UGB. In addition, areas contiguous to the UGB that drain naturally into the UGB are included in the revised planning area.

The planning area is generally boarded by the Wilson County line to the north, by the Smyrna UGB to the west, by State Highway 269 to the south, and by Murfreesboro UGB lying to the east.

Exhibit 5.1 which is right here of the facilities plan update delineates the planning boundary, and you're welcome to look at it at your leisure. A copy of this exhibit is on display here and is on display in the written document.

The planning area includes all of Overall Creek, Puckett Creek, Lytle Creek, Sinking Creek, and Bushman Creek drainage basins.

In addition, portions of the west fork of the Stones River, middle fork of the Stones River, east fork of the Stones River, Stewart Creek, and Fall Creek drainage basins are contained within the planning area.

The Murfreesboro Water and Sewer Department is responsible for wastewater collection, treatment, and disposal for the city of Murfreesboro, Tennessee.

The city's existing collection system is divided into several sanitary districts. Wastewater is conveyed to the Sinking Creek wastewater treatment plant for treatment and disposal.

The city is faced with short, intermediate, and long-term needs in regard to its wastewater facilities. Existing issues and future growth in the planning area will require an addition, collection system improvements, and increased treatment plant capacity.

This facilities plan update recommends the short-, medium-, and long-term wastewater system improvements necessary to serve the city of Murfreesboro in the planning area.

The facilities plan update estimates the construction cost of each of the proposed improvements individually. The construction may be funded in whole or in part under the State of Tennessee revolving loan program.

The scheduled construction for the recommended projects is subject to the rate of growth in the planning area and funding availability.

It is also anticipated that this plan will be updated every five to ten years depending on actual growth rates within the planning area.

This facilities plan update was prepared in accordance with Section 201 of the Federal Water Pollution Control Act Amendments of 1972. The recommended improvements in this plan are intended to provide a cost-effective, environmentally sound, and implementable approach to providing wastewater service to the present and future needs of the proposed service area.

With that, then, we'll go into the presentation. The first thing I want to do is give you an over-view of the plan itself.

The first facilities plan for the city of Murfreesboro was prepared in 1974. It was updated in 1986 and also updated in 1992, and then this update comes ten years after the '92 update and is officially the 2002 update.

We have a number of source materials that are listed in the document. We've reviewed virtually every planning document that has been available for this area for sources on the report.

The report is divided into two volumes. Volume 1 deals with the collection system. Volume 2 talks about the treatment and disposal systems.

So I want to move into an explanation of the issues regarding the collection system which is contained in Volume 1.

Murfreesboro and the service area have had a great deal of growth, as most of you are probably aware. The population of Rutherford County increased 53.2 percent in the last census.

The second issue that needed to be addressed was the expanded service area. Rutherford County has approximately 620 square miles. Murfreesboro itself is approximately 42 square miles.

In the 1992 edition of the 201, the planning area was 180 square miles; and as I mentioned in the narrative, it now includes the UGB which is about 205 and then the areas that are contiguous to the UGB that drain to the UGB naturally which includes another 27 square miles. So the total in the planning area is approximately 232 square miles.

There are aging facilities that needed to be addressed. The Sinking Creek interceptor, for instance, has been in service for 33 years. The Stones River interceptor has been in service for 28 years.

There are capacity limitations that needed to be addressed. There are certain bottlenecks within the system where the sewage does not flow in an adequate manner.

There are infiltration in-flow issues. According to the information that we have been able to gather, infiltration in-flow runs as high as 3.8 times the average daily flow in the system.

Finally, the regulatory issues and specifically the CMOM, the capacity, management, operation, and maintenance, issue which is a forthcoming regulation has been issued in preliminary form but is expected by the end of this year to eliminate all sanitary sewer overflows

from systems as early as 2011.

Let's talk a minute about the future needs. The planning period is 20 years, which means that we're looking at the 2022. According to the latest land use plans for Murfreesboro – and these have come from the planning department -- we've reviewed both the Blackman and Salem-Barfield as well as additional information from the planning office in preparing the land use estimates.

Population forecast is contained in the report in Pages 37 through 41. As you are probably aware, the city had 68,816 residents in the 2000 census. Which you may not be aware of, in the existing UGB, the population is 112,343.

By 2022, the city is expected to have 134,300 residents, and the UGB 193,200 residents. These are the information that we've gotten from the planning department.

General recommendations in regard to the collection system are as follows: We have divided them into short, medium, and long-term improvements.

The short improvements are expected to be initiated within one to five years, the medium-term improvements within five to fifteen years, and the long-range, fifteen plus years.

The monitoring program which the city undertook about ten years ago has been very helpful in trying to determine where flows are coming from and how much flow is coming from each area.

The city department has 12 permanent flow monitors in the system. We have recommended that they add three to that. In addition to that, that they have one temporary monitor available for each of the permanent monitors so that we can further classify where wastewater issues are coming from.

The CMOM issue that I talked about moments ago is something that is integral to the department's program today. Most of the components of the CMOM program are already under way. And what we're recommending as part of the general recommendations is that the department fully implement the CMOM program as will be required under the Federal regulations.

We talked about design criteria. Sewer pipes are not designed to flow full. They are designed to flow at 70 percent capacity. That allows the pipe to have extra capacity for that infiltration in-flow which may get into the system. And the idea is to build the sewer pipes big enough to keep all the wastewater in the pipes.

Regulations and codes: We talked to the department and believe that it would be advisable for codes to require that owners of lateral sewers, that being the house connection from basically the roadway to the house, maintain their pipe because they are often the source of some

or much of the II problems that inhabit the system.

Finally, under general recommendations, is that there be a five-year update cycle rather than a ten-year update cycle, that these documents be updated every five years.

The proposed short-term improvements includes ten projects. The estimated project costs are a little over -- almost 41 million.

Five projects have already been initiated by the department. I might show Table 1.1 shows all of those projects. As you can see, there's the Sinking Creek relief sewer which is planned. That's the lower portion of the sewer from where the VA sewer connects into the existing Sinking Creek and runs into the plant.

The Bushman Creek relief sewer also known as the DeJarnette Lane pump station which is in design now and will be advertised for bids in the next month or so.

Miscellaneous abandonment of the pump station Number 15, southwest relief sewer, Phase 1; the Elam Road/Buchanan Road sewer which is under design; the Salem-Barfield sewer, Phase 1, which is under design; Puckett Creek interceptor, Phase 1, which is planned; the Bradyville Road replacement sewer, which is planned; miscellaneous projects in the Cherry Lane area; and the medical center parkway project which is currently under design.

The total is right at 41 million dollars. Of that total, $22,500,000 is currently not under design.

The proposed medium-term improvements are 18 projects, estimated cost of $90,858,820. Table 1.2 shows these projects.

Without going into every one of them, it's additional work in the Cherry Lane area, a relief sewer for the VA, improvements to the Sinking Creek sewer, Phases 2 and 3, northeast relief sewer, Bushman Creek relief sewer Phase 2, Bradyville Road relief sewer, Lytle Creek Phase 1 and 2, Overall Creek interceptor Phase 1, Puckett Creek Phase 2 and 3, some miscellaneous projects, Stones River relief sewer which I'll come back to in a moment, southwest relief Phase 2, Salem-Barfield Phases 2 and 3, and US 41 State Route 840 sewer.

I said I would come back to that project known as the Stones River relief sewer. When I was talking earlier about bottlenecks in the system, one of the potential bottlenecks that we have is at the screw lift station near the golf course.

The screw lift station has a certain capacity, and we are projecting that we will exceed that capacity during this planning period.

And what we have planned to do under the medium-term improvements is to provide a new sewer which will off-load some of the increased capacity to that screw lift station and bypass the screw lift station to take the flow directly to the plant.

The long-range improvements which are proposed are ten projects, estimated construction cost, $62,516,220. They're listed in Table 1.3.

The northern collection system is the largest one, the east fork collection system being the second. And the others are the Walter Hill collection system, the Sulphur Springs Road collection system, Lytle Creek Phase 3, Salem-Barfield Phase 4, Puckett Creek Phases 4 and 5, Overall Creek Phase 3, and the Stewart Creek collection system.

So those are the improvements that are recommended under the plan, both short, medium, and long term for the collection system.

The next thing I want to talk about is Volume 2 of the report which deals with the treatment plant. The issues that face us regarding the treatment system are very similar to the ones that we had in the collection system, growing population. We're going from 68,816 to, according to the planning department, 134,300 in the planning period.

The expanded service area which I've talked about before, increased waste strength. In 1992, the five day BOD and the total suspended solids averaged about 200 milligrams per liter.

The plant, the Sinking Creek wastewater treatment plant, was designed with those parameters in mind. Those numbers have been steadily climbing, and today are over 250 milligrams per liter per day, and in some cases for some months as high as 300 milligrams per liter per day.

The effluent disposal issues: The permit, which was issued in August of 2001 became effective in October of 2001, grants the city of Murfreesboro capacity of 16 million gallons per day that they can discharge into the west fork of the Stones River.

When the new permit was issued, it doubled the amount of flow that could be discharged. At the same time, it did not increase the mass loading discharge limits at all. So what it effectively did was cut in half the mass loading limits on a per unit basis that could be discharged.

Future disposal, we believe, will require us to look at alternatives other than the west fork of the Stones River, and we will discuss this more later. But the future disposal, we'll look at land application and reuse.

Another issue is the regulatory issues which are ongoing. There are proposed new nutrient limits for phosphorus and nitrogen which will materially affect the treatment plant and will necessitate us making some changes in the long run in order to meet those limits.

Also, you may be aware that there is a TNDL study underway now by the State which may further shed light on what the capability is of the receiving stream, that being the west fork of the Stones River.

The next issue, going from the current issues, is the future needs. We need to increase

the hydraulic capacity. We've recommended that by sometime in the neighborhood of 2007, that the capacity be expanded 8 million gallons a day from 16 to 24 million gallons a day; that the increased BOD suspended solids treatment capacity be expanded from a current 26,000 pounds per day up to about 60,000 pounds per day.

We are making plans to design the plant and to retrofit the existing plant so that it will be capable of treating waste streams in the neighborhood of 300 milligrams per liter BOD and suspended solids.

We're looking at adding a phosphorus removal unit, an anaerobic unit, ahead of the main treatment system and also modifying the existing sand filters by adding methanol to cut down on the nitrogen.

As far as biosolids, we're going to need to have more capacity for that. We've made some recommendations for the on-site handling. We will retrofit some existing units, build some new units, and add to our existing filter capacity at the biosolids building.

Finally, the effluent reuse or effluent disposal options, we believe that anything over 16 MGD that the plant produces will have to be either land applied or effectively reused.

Treatment options we looked at which we believe were viable for the city to consider: One was to expand the Sinking Creek wastewater treatment plant to 24 MGD and pump the effluent to the Cumberland River for disposal.

Second was to expand the Sinking Creek wastewater treatment plant and pump the effluent to the Percy Priest reservoir using a deep discharge within the reservoir.

Thirdly, was to expand the plant and pump into a reuse system.

Fourth, to provide advanced treatment at the Sinking Creek wastewater treatment plant.

And finally, to build a new plant in the southern sector of the city.

After reviewing all of those, the one that required the least amount of capital and the one that had the lowest present work cost was this option, which is the Phase 4 expansion of the Sinking Creek wastewater plant.

It will include modifications to the pump station, to the head works, adding the phosphorus removal unit as I talked about before, a new extended aeration basin and modifications to the existing ones, a new clarifier, a new filter building, methanol storage and feed for the filters, additions to the existing ultraviolet disinfection system, and a revised handling and de-watering system for the biosolids. This expansion is slated to be AMGD.

Looking at the next -- for the reuse land application system, we've recommended that in the short-term, that the department, the city, initiate what we have termed Phase 1N Phase 1 South. They're shown on this exhibit here.

Phase 1N comes out of the existing plant site and runs over towards the VA site.

Phase 1 South connects into an existing reuse line that's already in place and runs over towards Thompson Lane to the proposed medical center site and over towards Old Fort Golf Course.

There are regulatory issues and code issues which will need to be addressed. We're looking at a time line of having this on line in the neighborhood of probably 2003 now, but initiating sometime this year.

The estimated construction cost for this first phase is 8.87 million, and that does not include land cost.

I should say also on this exhibit that we have shown certain areas that have been identified and have been asking for potential purified, repurified water to be brought to their sites for their use for irrigation purposes, and then two dedicated land application sites that have also been considered.

Phase 5 of the Sinking Creek wastewater treatment plant is proposed in a time line that is unclear at this point. That's why you see it in the neighborhood of 2017 to 2027. A lot of it depends on how fast the service area population grows how much demand there is for sewer, how much solids that we receive from the waste stream.

The estimated cost of Phase 5 -- and these are present worth dollars -- is 18.2 million.

In summary, this plan is meant to be proactive versus reactive. In 1992 when the update was done, it was in a reactive basis because the city had been having some trouble with the wastewater treatment plant that needed to be addressed.

This is a proactive stance to try to keep ahead of the curve, to try to keep the wastewater in the sewer lines which is required under the Federal government laws, and also to provide the adequate treatment capacity.

We believe this should be a living document rather than a static document, that it should change as conditions change. And that's why we've recommended that there be at least five-year updates.

As far as acknowledgments, there's a long list of acknowledgments. And at the risk of missing somebody, I won't go over them here. But everyone in the department and Joseph Aydelott and the city and the city manager's office as well as John Davis with the Rutherford County Regional Planning Commission have been very helpful and very forthcoming with information that has been beneficial to putting together a report.

So that's the short of it. And we're ready to entertain questions at this point.

MR. MOSER: Has anyone got a question they would like to ask?

MR. KIRCHNER: If you do have a question, if you would come up to the mike here, state your name and your question, and then we'll try to answer those.

If we don't have answers this evening, we'll get back with you on those. Some of them may be more in depth or whatever. But we'll certainly try to answer any questions that may come about.

If you think of something after the meeting, please get them to me. We'll try to make every effort to answer questions that you might have.

And like we said, it's a living document. Come by my office any time, and my staff and I are more than happy to sit down and talk about issues.

MR. BAINES: Mr. Kirchner and members of the Board, my name is Richard Baines. I live at 1319 Parkview Terrace in the city. And I appreciate the opportunity to speak this evening.

This is a subject that I've harassed Mr. Kirchner on for a long time, getting this information. And I want to compliment Mr. Diehl and his organization on an excellent presentation. It's one that -- it's readable for an average person like myself. There's a lot of technical data in it, and they've presented it in a very readable fashion.

However, one of my questions pertained to the actual size of the planning area. The way the report was written, at least Volume 1, it was a little bit ambiguous as to what that area encompassed. And Mr. Diehl has straightened that out, except for one statement which is on Page 65.

And I'm quoting, (as read) In addition, the planning area includes certain drainage basins which are contiguous to the UGB and drain naturally into the UGB.

And it alludes to this area being -- the UGB being an area of influence for the whole planning area. And the inference in there is that the UGB is like a catalyst that allows expansion that would be the catalyst exactly for expansion beyond its own boundaries.

In my opinion, this would be a blatant disregard for the spirit of the law, this so-called tiny town law, which was intended to limit the municipality's area of influence rather than expand it.

Topic Number 2, quoting from Page 39, (as read) Present policy requires that any development requesting sewer service must also request annexation before the Murfreesboro Water and Sewer Department will provide water and sewer service to the development.

To me, it appears that in order to circumvent its own code, the city has chosen to establish sewer assessment districts. And I'm wondering what will be the rule for the planning area that we're speaking of tonight? Will it be annexation or sewer assessment districts?

Because we've got -- seemingly, we've got two options. My personal opinion is that the

sewer assessment districts are not legal as long as the annexation code is on the books in its present form.

And I don't know if you're prepared to answer that question.

MR. KIRCHNER: What was the question again?

MR. BAINES: The question was, what is the plan for this expanded area, this area in red beyond the UGB or in the UGB? Are these going to be sewer assessment districts? Are they going to be annexed under the code?

MR. KIRCHNER: To answer your first question, as far as the area, it's defined real descriptively on this illustration 5.1.

You have your planning area in red that we have for our 201 plan. You see there. The UGB is the shaded light yellow area. Then everything you see in between is what is outside of the UGB but in our planning area.

So the majority of it is the middle fork basin. There's a little bit to the west here in the Stewarts Creek basin, and most everything else lies within that.

Sewer doesn't have -- or natural flow through these basins is not dictated by a political boundary. It's prudent on us to plan for those areas beyond the 20-year, and that's what this thing did.

So we looked at that as far as planning. Now, when that's going to be out there, of course, one of it is the Buchanan sewer that had a catalyst to go out there. So we reacted to that.

This area to the Stewarts Ferry area, there's not really anything that's been, you know, brought to the forefront on it. But you never know when something will be there.

But we thought it prudent to look at those areas so that we could make sure that the plant capacity was there and plan for those things.

Now, whether the -- what will be the norm? There won't be a norm as far as an assessment district or annexation. That's going to be done on a case-by-case basis. You've got to look at the project, is basically what we have done.

If there's a large area, we've normally looked at as an assessment district. The reason from that is that we've heard loud and clear from a lot of people that growth ought to pay for itself. So we've tried to get through the assessment districts for those that are using it and expanding, that they would pay for that system.

Now, the code requires owners in that area to request annexation. And the planning commission would -- the city planning commission would consider those requests on their own merits.

It doesn't mean that they will have to be annexed. It would depend on how efficiently

and how well the city could provide other services.

So I think as to whether it would be annexed or not, it would not be a question whether sewer is going to be provided or not. It's going to be a question of what other services could be effectively provided to those areas.

An area could be sewered outside of the city limits, but there are some stipulations required of that. If they do develop something outside the city on sewer, then they're required to construct within that subdivision per our regulations. So it's going to have curb and gutter, it's going to have storm drainage, it's going to have sanitary sewer, those type things. It's going to have the fire protection.

So it can go outside the city. Whether it's going to be annexed or not is going to be something that will be studied by the planning commission in its due diligence, will look at whether annexation is the thing to do or not to do.

MR. BAINES: I think my question is, this is kind of like a chicken and egg thing. What comes first, the sewer or the request?

MR. KIRCHNER: The request for --

MR. BAINES: The code says -- and I may be wrong -- but I think the code says direct request for annexation must proceed request for sewer before the board will act on it.

MR. KIRCHNER: No, I believe they go concurrent, that the owner has to request annexation. And as in the whole purpose of the contract that's stated in there of stipulations, it said they could continue on with their planning and things in their project while it's being considered for annexation.

Then at that point, it would be up or down on the annexation. If it's down, it would be under a contract with the city. It would be provided sewer service. If it's decided to annex it, then they would move forward with the annexation.

MR. BAINES: Okay.

MR. DIEHL: Mr. Baines asked a real good question. Number one, in regard to the comment regarding the areas outside of the UGB which drain into the UGB. One of the things that I didn't make clear is the effort on the environmental protection agency's part to go to a water shed approach in taking care of the pollution within a given water shed.

So part of the reasoning behind us going outside of that political boundary was to look at the water shed, because the city is doing a pretty major study right now in regard to water shed management that's outside of this report. But those portions of the water shed that are within the city limits, they have to clean up.

And so part of the reasoning in looking at this in this manner was to hopefully help keep

any pollutants from getting into the water shed before they got in.

So it's really trying to look at the water shed as a whole. I didn't make that clear the first time.

MR. BAINES: I'm glad you brought that topic up because it was topic Number 3 on my list.

Storm water run-off upstream from Murfreesboro has been a major contributing factor to the problem at the wastewater treatment facility. Correct? That came from your company. That was quoted, and I think it was even said, The major problems are upstream from Murfreesboro. I would have to dig up the document but --

MR. DIEHL: We're not doing that study, but let me tell you what I know. The State maintains what is known as a 303-D list as required by the environmental protection agency. And west fork of the Stones River and the middle fork of the Stones River are both contained on that 303-D list.

They're on the 303-D list for non-point source pollutions, not for point source. So what that says or what the State is saying is that the reason that the streams are on the 303-D list are not because of the wastewater treatment plant itself. It's because of conditions upstream of the wastewater treatment plant coming from farm land run-off, from run-off from other places that are getting into the stream.

So again, it's within the water shed. Does that clarify what you were asking?

MR. BAINES: I already knew that.

MR. DIEHL: Okay.

MR. BAINES: Because you did not get into that much detail in your report -- like you said, that's not your balliwick. It's not even the water and sewer. It's a city engineering project.

But it's kind of a Catch 22 situation. It's like taking a problem out of one pocket and putting it into another because development is part of this. When an area is developed, the run-off has to be not only controlled, but it has to be treated. It's going to have to be treated.

The NPDS regulations and the 201 regulations that we're talking about tonight are separate legal issues. But they're nevertheless technically joined at the hip. Would you agree with that?

When you run a sewer -- and that is topic Number 4, population density as it relates to sewer service. And I'm quoting Mr. Aydelott in the Daily News Journal in an article, (as read) Annexations are usually requested to take advantage of sanitary sewer. Sewer tends to raise property values and provide more convenience and provide more housing density.

And therein lies the problems, not controlling not only growth but it's controlling density

because that's where the problems come in. The housing -- the density, the number of units in a given area, impacts both the sewer system and the storm water run-off.

We frequently here the often repeated mantra, Growth is inevitable. And this is true. Just as often, we hear those who ask that growth be controlled labeled as being anti-growth. And I can assure you that I am not anti-growth.

When I speak of controlled growth, I'm referring to controlled density. It's the population density of an area that puts the overload on schools, infrastructure, and services.

Again, I repeat that the one service that impacts population density more than any other is sanitary sewers. There could be a lot of things impact growth, but the one that impacts density is sanitary sewers because you can change your zoning to, as you well know inside the city, from 15 to 12 to 10 to whatever when you have sewers. Without sewers, you cannot do that.

It's a genie that when let out of the bottle can create more problems than it solves. So who should be in charge of the bottle and who should make the decisions as to when to let the genie out? The governing entity or developers?

In today's world, indications are that it is the latter. The officials elected by the people inside this planning area can be stripped of their ability to represent the wishes of those who elected them by the actions of this board and the city council.

Topic Number 5 --

MR. KIRCHNER: Before you leave that topic, just to make sure we clarify some things, the city is -- a lot of these things cross departmental lines. And the city is making every effort to, I think, look at these areas.

Case in point is that the Blackman study area that was done when the school was initiated and the Overall Creek sewer, the city initiated a study that included a citizens advisory group, people that lived in that area, to look at these things as far as the density and how they would like to see it developed.

And that is, you know, what you're talking about, letting those in those areas plan on those things.

In addition to that, they also undertook this Salem Highway study area. So those are two studies that have been undertaken. And the efforts in what you're talking about is to look at those densities. They look at -- you know, we don't want all multi-family. We don't want all, you know, commercial in an area. But they look to try to balance those things.

And those two particular studies, I think, the citizens in that area had a voice and they had every opportunity to come and comment on those plans.

So I think that's what you're going to see is the norm in the future when we have these

larger areas, that we'll start seeing more of these plans that will be developed jointly with the county planning commission and the city planning commission, because there was much discussion on both sides of those areas because much of those areas right now are in the county.

MR. BAINES: That's good, and I agree with you. That's the way it should be driven.

At the other end of the spectrum, you'll see the confusion out at the Buchanan exit, that proposed area. If that area were treated as the Blackman area was, if it was that much attention paid to it and the people out there had that much input, I think everybody would feel a little bit more comfortable.

I'll tell you what with the problem as I see it is right now -- and we may have the tail wagging the dog -- is that the county commission has failed to attach a definition to the word rural.

And that is the very basis of the law, the UGB boundary law, that to separate rural from what will be municipalities.

Now, as it exists now, I think the definition of rural is RS-15 or is it 20? 15. Okay. Now, I live in an RS-15 zone. Much of Murfreesboro is RS-15. That is not the definition of rural.

And until the county gets off its duff and identifies what is rural by -- I saw one proposal which made sense, RS-40 -- we're going to be stuck right here, that developers are able to take the board and the sewer services from Murfreesboro and dictate not only where the growth is going to be but how dense it's going to be.

And the people that are electing these people are powerless. They have no voice in it. That's not the subject of this meeting, and I'll get off of it. Thank you.

Topic Number 5: Who is going to pay for this expansion to the system? In essence, I and those like me are paying an ever increasing sewer tax. That's who I feel is going to pay for it.

I've heard that the developer and eventually the person who ties into the service pays for it. But who finances it and co-signs the note with the Tennessee Municipal League or the bond holder? And where does the ever increasing amount held in reserves come from? Me and the others who pay sewer taxes.

If growth or expansion of the sanitary sewer system was even close to paying for itself, my water bill would not be going up at the rate that it has. Updating the system technically would not drive the rates up that high.

It's obvious that the income from the fees generated by new users is not enough to keep pace with the capital required by demand for expanded areas of growth.

The fact is evidenced by the statement in this report, Page 54, financing, the second

paragraph which reads, and I'm quoting, (as read) In some case, the length of time required to fully build out areas within assessment districts may exceed the period established by ordinance. In such cases, the ordinance should be amended to allow sufficient time for full recovery of Murfreesboro Water and Sewer Department costs within individual assessment districts.

I'm of the opinion that if there is any risk of not recovering your cost, our costs, within the time period -- and I think it's currently 15 years -- the project should not go forward, period.

I'm concerned that there's a point where developments that are very large and those who are not going to buy their water from Murfreesboro pose a threat to timely recovery of costs under the current assessment district's set-up.

The Buchanan Elam Road sanitary sewer assessment district is going to require 8.4 million to build, and it's going to be repaid over a period of 15 years. How does this sewer extension benefit me if it's not going to add anyone to the city property tax roles?

Mr. Kirchner has pointed out that one of the problems that the water and sewer department has in recovering costs is increasing numbers of SFU's, which is single family units -- you all know that -- on city sewers but not on city water.

Yet this proposal by and large promotes more of the same, and it just doesn't make sense. It seems like we're digging ourselves a hole.

In conclusion, I appreciate your attention and the opportunity to speak here tonight. And any questions or comments?

MR. KIRCHNER: Mr. Baines, I would like to make one comment to your last statement in that what happens if we don't expand sewer into these areas? Development will occur. It will occur on septic tanks.

As the city grows, those areas may be annexed, may or may not. They may be annexed.

What happens if sewer is put in place on the front end, the developer pays for all the costs of the water and sewer in the subdivision within that planned development.

So that's paid for without city dollars, without your dollars. If you wait until, say, 20 years down the road when a development has already been put in and it's on septic tank, it gets annexed, then I guarantee you those people are going to be clambering to the city council and to this board, asking, Well, you need to put sewer in our subdivision.

Well, then it becomes an issue of how do you fund it then? In a lot of those projects, I don't think those people could afford the cost of putting a system in if they had to pay for it for that subdivision.

So I think by putting in the trunk lines, then allowing the developers to put the subdivisions on it and pay for all that infrastructure, not just sewer but also the water, the storm

drainage, the curb, the gutters and things, then that saves us in the long term millions of dollars.

MR. BAINES: You're exactly right. But if the developer can't afford it, how can you assume that I can afford it? Because what I'm asking for is to re-examine the system that we have now.

That developer should put something into the kitty, something toward the water and sewer department's reserves, because these costs are going up, up, up.

I haven't been down to city hall, but I'm going down there and I'm going to look at your budget and I'm going to look at the rise in your debt service, because that tells me, you know, how much money you're going to have to borrow, how much you are borrowing.

And I know where that money comes from. It comes from me. That's exactly where it comes from. And it's my feeling that that developer ought to be kicking in something toward that reserve at the front end.

I mean, I understand that it costs millions of dollars to put these lines in, and there's no developer here big enough to afford that. But neither am I big enough to keep on affording to have my sewer and my sewer tax -- and I call it a tax -- go up and up and up. And it's tied directly to expansion.

I can stand upgrading the systems because they need to be upgraded. I can stand paying more to have the systems retrofitted. But I cannot stand to be part of financing growth out into the county.

And that's what I'm asking, some way of innovative financing. So give it some thought, because you're heading into a direction that I'm very uncomfortable with. And I'm just looking for the other shoe to drop in the city of Murfreesboro especially when this storm water treatment discovery mandated thing, which is not funded by any Federal agency -- it's going to come right out of our pockets -- when that puppy hits, we're going to have some more problems, some more costs.

Again, thank you for your time.

MR. MOSER: Mr. Baines, thank you very much. We appreciate it. We have a gentleman back here who would like to --

MR. DIAMOND: My name is Paul Diamond. I come from the Christiana-Buchanan area, and I have several questions.

One question is Mr. Farrer and Buchanan Estates: Now, you're saying that he's paying for most of this or will be? Well, if I read his contract correctly, not the way the Daily News Journal reported it, he is paying nothing. He is paying a thousand dollars for every house hooked up.

And in fact, if there are more houses than his quota, he doesn't even have to pay that. So let's be straight about these things.

We have copies of the contract. And let's get some other things straight. If I remember, when Buchanan Estates was presented at the city council, it was on a request of annexation. And the city was going to provide all the city services.

Would you believe it? The mayor and the city manager said, Oh -- this would be two or three weeks, I guess it was at the last meeting, they said, Oh, well, I don't think we have the funds for doing this.

So I guess there went the city fire department. There went the storm water drainage. But we still have those little plastic curbs, no problem. But city inspection of houses? Oh, no, we can't do that. We don't have enough inspectors.

So you get a little glimpse of why you're going to hear some hostility in my voice that what you say is not really what you always do.

Now, let's talk about all this contamination coming from upstream. Well, I don't remember seeing middle fork of Stones River contaminated. And in fact, I sure don't see where the water stream going through Mr. Farrer's property is contaminated. It was labeled fair.

And in fact, in my petition signing days, I remember seeing the current planning of Murfreesboro where in the Cason Lane area, there was subdivision water going like a full-blown stream just pouring off the macadam, carrying with it the phosphates from the soaps and fertilizers on the lawns, going straight into Stones River, just pouring in.

So where is the contamination coming? From all those cows? What do you think, this is Texas now? You know, the sale barn is gone out of Murfreesboro, long gone. Where are all the cows and cattle and contamination?

I suggest you all take a ride just out in the country and see what's left; or go to the Co-op, ask them how many active farms are really putting all this stuff in the streams. I don't think it's there.

The other question comes up, the drainage areas. And this is of particular concern because I kept saying, gee, whiz, do we have to put the sewers in the stream?

It seems to me that that's not a very logical option because of contamination of the water and then further contamination if the streams are going to be used for storm water drainage.

And then I was just -- you know, always that was down played. Oh, no, you can't use, you know, a forced main system. You just have to go with gravity flow.

And then you try to find out, well, gee, I wonder if they have gravity flow in San Francisco, you know, or New York? I mean, how do they get sewers in these places?

There are some places in Murfreesboro proper, by the way, where sewer doesn't go uphill, some places where within two blocks from city hall that doesn't have sewers because we can't get it uphill yet.

And that's left up to the individual owner, which is also what we're going to do. The owner of the house is going to be responsible for his share of the line.

Well, I think that when the school board met, they showed for $400,000, you could take a forced main system and take it to the school. And in fact, they didn't want to hear any of it. All they wanted the city for is a place to dump their effluent, and they didn't need any streams.

So I think all of this is going on without any participation of county government to have anyone from the county saying what we plan to do with storm water drainage.

And as you know, the storm water drainage for Stones River is on the northern side of these hills just in front of Beech Grove that runs all the way parallel. That's where it is.

And I haven't seen any study for the city that discusses in any detail nor for that matter from TDEC where they haven't done a whole lot of study. Nobody really knows what's out there.

So I see piecemeal kind of things going on. And I'm not really too happy with what I see as storm water in lots of places from the city just pouring directly into the stream and then saying, Oh, yeah, the contaminants come way from, you know, up there in those rural parts.

I think you need -- and as far as people participating in what is going to be put in their neighborhood, let's face it. When a developer puts up a 2100-home subdivision without fire or water or police support and gets the okay for annexation by Murfreesboro which denied any participation, any real participation -- since we're in the county, we have no vote -- then you've got to say, Who's holding the big stick?

So you appoint a committee. Well, we all know what constitutes appointed committees. The county can appoint any kind of committee. The city can appoint any kind of committee because the city is pulling the county.

And I grant you, the county is slow, but not slow -- doesn't mean the residents who live there are slow. I think we're pretty much aware of what's going on. Thank you.

MR. MOSER: Thank you, sir.

MR. SCHROEDER: Yes, my name is Steve Schroeder. I live at 676 Cottonfield Lane. I live out in the county, a couple of blocks away from Mr. Farley.

And I would like to know whether or not the comments made during this discussion are going to become a part of the public record?

MR. KIRCHNER: Yes. This is being video taped, will be aired, and will be part of the minutes of the meeting.

MR. SCHOEDER: That being the case, then I would like to let everyone know that I certainly endorse the comments of Mr. Baines and appreciate his effort.

I would also like to go back to a comment made by Mr. Kirchner with regard to the Blackman land use study and the number of citizens who participated in that.

And I would like as a matter of record that the record show the number of residents of the Blackman community who participated in the Blackman land use study versus the total number of people who are on that committee.

It's my recollection that there were on -- a neighborhood of probably about nine different folks who were on the committee, and I think only two of those people lived in Blackman.

MR. KIRCHNER: There was a committee established, and they had numerous public meetings with the residents. That is all public record.

MR. SCHOEDER: I understand it's all public record. Now, what I'm asking you to do is to go in and -- you made the statement, as I remember, that there were a lot of citizens from the Blackman community who participated in that.

MR. KIRCHNER: Yes, because I was at the meetings they attended.

MR. SCHROEDER: I don't believe that's true, that they were on that committee. And I would like the record changed to reflect that.

MR. KIRCHNER: That's fine. They were not on the committee. But there were public hearings and residents of the area that were incorporated into those discussions. We got their points of view.

But the committee itself was a finite number. You are correct. But there were several public hearings that are of public record that people came, observed what was being done, and gave their input to.

MR. SCHOEDER: That's correct. I agree with that. However, one of the other issues has to be the way that the public input was used by the committee. And there's a significant difference from the standpoint of being able to say, Hey, we took into account all of the public comments versus what was actually done.

Thank you.

MR. MOSER: Thank you, sir. Is there anyone else?

MR. LENTON: Thank you. I'm Mike Lenton. I live at 155 Spence Creek Lane which is just outside of the borders of Murfreesboro, tonight. I don't know about tomorrow the way Murfreesboro is growing.

Several issues I would like to speak about: I would just like to give my hearty endorsement to what's been said before, and also thank you for thinking in the long term.

This is so important, just not thinking five, ten, but fifty years down the road, especially when we look at numbers which were given suggesting that our population will double within the urban growth area.

One thing specifically, I think it's a real problem, this area that's been talked about previously tonight, this area which lies outside the urban growth boundary. It's been mentioned that we don't have a definition of actually what is a rural area.

We are represented by an attorney, Frank Fly. Frank isn't here tonight, but you all know Frank and he's been in a whole variety of meetings. And if he were here, he would wave the law for us.

And the law as established by the State of Tennessee isn't really court specific but is suggesting that an area outside of the urban growth boundary is rural, meaning it's appropriate for critters. It's appropriate for farms. It's appropriate for low-density housing.

I certainly understand the business regarding flood plains and that water generally does flow downhill. But boundary lines are legal, and even water can't flow over them.

And what this means is that if these areas down here and here are sewered, we have put in, as you said tonight, the infrastructure for high density housing which will go absolutely contrary to the characteristic of the law at least as it's been interpreted for me and certainly for the city commission.

This is, I think, a significant problem and something which really very well may have to be discussed in court. Thank you.

MR. MOSER: Thank you, sir.

MR. FARLEY: I'm Gary Farley, and I am a county commissioner out in the Barfield-Christiana area.

I've had -- when it come out in the paper, it's not about what you just got through having a public hearing on, it's about the Christiana school deal that will be coming up.

Mr. Kirchner, I called him and I asked him and I'd had some phone calls and some people wanting to ask some questions and make some comments. And he said this would be the time for that to happen.

First of all, I want to thank the city of Murfreesboro for looking at running the sewer out to the Christiana school, the old Christiana school and the new Christiana school coming up.

I think it's a very needed system out there for us to have our school out there.

I know there are some people in the area that are wanting to hook up, if at all possible. Now, I have told them -- I've discussed it with Mr. Kirchner and also Valerie, and they told me that it's a private line if it does -- if this board and the city council does approve that.

There are some people out there that are interested. And I told them that it could happen and it could not happen.

And at this time, if anyone of them would like to raise their hand that are out there in the area that would like to hook onto it if it come to that, I would like them to raise their hands at this time.

(Several hands were raised.)

MR. FARLEY: And there may be some of them that would like to come up and make a comment or whatever.

MR. MOSER: Mr. Farley, we have, you know -- Mr. Kirchner and I talked today about this same situation, and we have looked at this. And they're interested only in running to the school, the school board is.

And I asked Mr. Kirchner, I said, Why could we not put a sanitary sewer there that would flow back into our system because it would serve a lot of people like is out here in this audience today?

The difference is about 3 and a half million dollars. That's the difference in acquiring the right-of-way. And, you know, as you've been in this business, you know that's sometimes very difficult to do.

But everybody doesn't want our sewer.

MR. FARLEY: Right.

MR. MOSER: You know, so we -- but, of course, my thoughts were that we ought to try to do that if that is possible. It's a money situation. It's whether the people want it or not. Because the school has got, as I understand it, to have a sewer.

MR. FARLEY: Right.

MR. MOSER: Because I think they're to the point right now they need it probably tomorrow for the old school even.

MR. FARLEY: Correct. It's a problem out there with -- you know, it's running out in this field, and it causes a problem, a health problem with that.

MR. MOSER: Yes, sir.

Joe, do you have anything you would like to add?

MR. KIRCHNER: I just want to make it clear, too, that the first article that came out kind of sounded like we had taken action. This board has not been presented anything on that until this evening.

So, you know, a lot of that was, I think, presumptuous. And we will take it -- we'll make a recommendation to the board, and then they will deliberate on that; and in their due course, take

some kind of action on it.

But we certainly didn't want to get in the situation where we've been criticized before for circumventing the county planning commission and the county executive.

We certainly want to get their input and make sure that they're agreeable to this. Because like Mr. Moser said, some people want it, and some people don't.

And we want to make sure that -- we've been criticized for not including them in these deliberations, and we want to make sure that we do include them.

MR. FARLEY: Right. That's correct. And, I mean, like I told them when they called, when the article came out in the paper, I was getting phone calls and I couldn't answer their questions.

So the first thing I done, I called Joe. And then I couldn't get ahold of Joe, so I called Valerie, and they led me in the right direction. And I've told -- well, Mr. Arnold is really the one that called me, and he's sort of the spokesperson for that area out there. Most people were calling him.

I told him up front, you know, we've got people out there that don't want it. We've got people out there that do want it.

And I'm not going to get in that board. I know personally, I like the sewer. If I lived out there, I would want the sewer. But there are people that don't want it, and there are people that do want it.

MR. KIRCHNER: Mr. Farley, the one thing about the school that they made clear to me in our discussion with their staff is that they needed a school right now, and they're constructing it here and will hopefully open it up within two years or a year and a half.

MR. FARLEY: Right.

MR. KIRCHNER: You know, if we did a gravity sewer, it wouldn't be ready by then.

MR. FARLEY: Right.

MR. KIRCHNER: So that was another concern of theirs that we need it today. And they knew that anything that we did was a long-term type project. It would probably take a year to design it and then another 18 months to construct it. So you're looking at a couple of years out, and they needed something right away.

So that's one of the considerations that we'll have to give to this.

MR. FARLEY: Right. That is correct, because I've been fighting for the last two years to get a school out there in that area, along with Dr. Jones, him being a school board member, because Barfield School right now is overcrowded by approximately 300 or 400 kids. So we do need to be moving.

Finally, we're going to be getting a school out there in that area.

MR. MOSER: Well, you know, I totally agree with you. If it's feasible, it ought to be a gravity sewer -- and that's my opinion personally -- instead of putting a tight line all the way out there to the school and serve only the school itself.

MR. FARLEY: All right. Thank you.

MR. ARNOLD: Mr. Moser, it's good to see you.

MR. MOSER: Yes, sir, Mr. Arnold. It's been a long time. Both of us has got gray headed since then, I think.

MR. ARNOLD: Sure have. We've known each other for quite a few years, and the rest of the board here.

I'm speaking on behalf of the property owners down 231. I appreciate y'all coming.

I recently bought some land from Mr. Ralph Loyd up on Marshall Knob. I'm kind of gravity flow, if you think about it, back this way toward the city.

So in the meantime, as it was presented to me the way the school board is getting the line out there, they're going to dig a 36-inch line, 36-inch ditch.

A 36-inch ditch is a pretty wide ditch. Is it feasible to put a force main line in for the school and a gravity flow line in for the residents in the ditch as it's being constructed? Because that's mainly your cost on construction. Is it the material?

MR. KIRCHNER: No, it's not. The gravity flow would have to go with the relief of the area, and the force main can overcome hills and things like that.

Also, you need more separation from all of the utilities and that. So it's just not that simple of a thing.

MR. ARNOLD: Is it 18 inches apart that the lines could be in the ditch?

MR. KIRCHNER: I believe what I've heard from the school board, they are proposing to put a gas line and the force main 18 inches apart in the same ditch.

That's what makes it economical for them. If they had to do a separate ditch for each, then it may not be so economical. But they needed the gas, also.

One thing we did say is that, well, we were concerned that they were putting it in the right-of-way of the highway. Because what happens if later the highway department, Tennessee Department of Transportation, wants to modify within the right-of-way or expand, then if there are any utilities within that right-of-way, it's at the cost of that utility to relocate it.

MR. ARNOLD: We have a right-of-way, CUD, going out that way on the water. Is it feasible to put it on that right-of-way?

MR. KIRCHNER: Not without -- you would still have to get an easement on top of an

easement. We can't do anything without the permission of the property owner.

MR. ARNOLD: Okay. Well, you have my permission.

Mr. Moser, if you could say if you could get the main out there not on a force main, that would really be appreciated by the ones that's here tonight, because we basically don't have any systems out that way that will perk.

I understand by talking to some of the property owners, I'm a retiree, Aerostructures-type worker, and I haven't been involved too much in politics. But I can, you know, kind of have my feelings about what's happening in our city and what's happening in our country -- I mean, our county.

I live down here in the lower southern end of Rutherford County with a farm and have a few cows. You know, I'm sitting here listening. If you wanted to dump some of this solid waste, I have some real big fields, if you want to take care of some of that. But, now, I'm offering that as, you know, we'll talk later.

But Mr. Moser, I thank you. This would be a very prompt time to consider that for the residents out there on 231, out the urban growth boundary line here, because we could share the cost. And I don't know what the value -- how much it would be per owner. I think that would have to be figured. And as I went around and got the petition -- I walked the highway out here -- there's one lady out here that can't sell her property because she doesn't have a back-up system for her sewage. She cannot sell her property. She's sitting there wanting to sell, but she cannot sell.

A sewer line going that way would give her that back-up system. Thank you very much.

MR. MOSER: Thank you, sir.

This lady?

MS. PARSONS: My name is Susan Parsons, and I have a question. I don't know whether you're going to be able to answer it, Mr. Kirchner. But Mr. Farley and Mr. Kelly are here. They may know the answer.

I am outside the UGB. And my question is, I'm represented by, of course, the county. Is there any prohibition that the county is not allowed if they choose to extend sewer services out into residents outside the UGB, that they cannot go under contract with you all or provide that through CUD, that it has to go through the city and that the requirements would then cause annexation or -- not cause annexation, but that the request for annexation be made?

MR. KIRCHNER: Let me see if I get this question right. You're saying, can the county extend sewers and is there funds and efforts to do that?

MS. PARSONS: In other words, can the county initiate if they have a need for a sewer line in one of the county schools, can the county initiate that without going through the process of

the city and the annexation request? Can they come to you? Do they have any authority to come to you, or -- I don't think CUD does sewer lines. But --

MR. KIRCHNER: Correct. The answer to your question is that yes, they would have to come to us and they would fall under the ordinance and would have to make their request for annexation. But like we said before --

MS. PARSONS: The county would have to request annexation?

MR. KIRCHNER: Yes. Like in the Christiana school, they will have to request by our ordinance that annexation.

Now, that will be in due deliberations by the city planning commission as to whether it would be annexed or not. You know, they look at a lot of different variables in that. And my gut feel is that we're not going to go out and annex the Christiana school because of how far it is out.

MS. PARSONS: In the Buchanan area, if the county felt that there was a public health issue or some situation there, could the they have come to you and asked you to run the sewer line out there?

MR. KIRCHNER: They could come and ask us, or they could have done it themselves.

MS. PARSONS: They could have done it themselves?

MR. KIRCHNER: Yes, but they would still have to request the annexation.

MS. PARSONS: But the county could have done this themselves?

MR. KIRCHNER: In fact, this was done 20 or 25 years ago out Halls Hill Pike. The county received some community development grant funds and extended sewer out there and donated to the city to operate. And it's still in place today. And I think over at Searcy and Tune, I believe that was also --

MS. PARSONS: They donated the land?

MR. KIRCHNER: They donated the sewer. They installed the sewer and then said, Here it is, you operate and maintain it. You know, We'll pay for it. We got it in. We got this money to do it. Now you operate and maintain it.

In other words, it's kind of like a developer does. If he puts a subdivision in and he puts a sewer in there and then he donates that to the city as part of our system, and we operate and maintain that.

It was the same thing there. They got the funding for it. They put it in place and then turned it over to us to operate and maintain.

MS. PARSONS: Okay. So that basically if a developer or a community felt that there was a need for a sewer line, they could have gone to the county and expressed this need rather than circumventing that and going to the city?

MR. KIRCHNER: I believe they could. But probably the county would then come to us and --

MS. PARSONS: But you certainly understand that as residents of the county, the representation falls in the county, not the city. So that you would think you would go to the person who represents you and make a request to him?

MR. KIRCHNER: I guess you go to the provider because, for instance, the CUD, they're the water provider. You don't go to the county to get water. You go to CUD.

MR. DURHAM: The county could develop their own sanitary sewer system. That's the answer to that.

MR. KIRCHNER: Correct.

MR. MOSER: On the Halls Hill Pike, what was out there was a low income area and the Federal governments said, This money is available to cities if you meet this criteria. And we met that criteria, the county did. And they said, Look, we have these funds, we're going to build this sewer out there. And they built it and turned around and when they got it built, they gave us the sewer and said, Would you operate it?

MS. PARSONS: Okay. Well, I just, you know, have a little bit of a problem when a developer goes to you or the city and the county, and basically that's out of the loop. The county representation falls outside of the loop.

The school board is now coming to you over the Christiana school. And you in turn will be dealing with the City Council; correct?

MR. KIRCHNER: Correct. That would have to be the process.

MS. PARSONS: Again, I mean, it's like there's no representation, that they are circumventing the county in this issue.

MR. KIRCHNER: We've tried to pull that back in, though, because before we considered it, we wanted to make sure that the county planning commission and Nancy Allen and all -- we did not want to --

MS. PARSONS: The full commission?

MR. KIRCHNER: Well, I don't know about the full commission, but we are going to --

MS. PARSONS: Well, Nancy Allen is not the commission.

MR. KIRCHNER: Well, the planning commission is the one that would be considering the site plans and things of that nature.

MS. PARSONS: Right.

MR. KIRCHNER: And I've talked to John Davis and told him that, you know, we need to make sure what their feelings are on this. My understanding is --

MS. PARSONS: Has this gone before the planning commission?

A SPECTATOR: Yes. It didn't pass the full commission.

MS. PARSONS: I missed it. Okay.

MR. KIRCHNER: And we didn't want to circumvent that. That's the reason we were concerned when it came out in the paper, it sounded like it was a done deal and we did something. We did not.

That's when we got back with the school board and said, Look, we need to make sure that the county executive is involved, the planning commission is involved, the county planning commission, and things of that, so we get everybody into the planning loop in that.

MS. PARSONS: Well, I'm kind of wondering why we have any county representation because it seems to me that if we're going to go straight to the water and sewer board and then to the city council, that somehow -- you know.

MR. KIRCHNER: I think one way to look at it is, we're the provider of that service. So they would certainly come to us about that.

MS. PARSONS: But with the annexation there --

MR. KIRCHNER: The county planning commission has the land use authority over that. They're the ones that set the land use. They approve the site plans and things of that nature.

So the county still has a major play in that. Granted, the sewer gives them other capabilities they wouldn't have before as to development, but still it's the responsibility of the county in those areas for planning of that.

That is not our responsibility.

MS. PARSONS: Yeah, you're just the facilitator?

MR. KIRCHNER: Right.

MS. PARSONS: Right. Right.

MR. KIRCHNER: When the sewer line is put out there, it certainly facilitates development.

MS. PARSONS: Oh, yeah.

MR. KIRCHNER: And people are looking at those properties and the values that they could get from it and the higher densities. And that's their prerogative.

MS. PARSONS: Or the carrot of annexation.

MR. KIRCHNER: Well, I want to explain maybe how that came about.

About 20 years ago, there was some development occurring on the fringes of the city limits. A developer adjacent to the city limits got approval from the county to place a subdivision -- well, it was a cul-de-sac basically, a strip street, in without curb and gutter, without

underground utilities, with water and sewer.

The water and sewer department said, Yes, we'll provide water and sewer. They went to the county and got zoning, put it in, substandard to city street conditions and things and all.

That made us stop and say, Look, that's not right. If we're going to provide them the water and sewer, which is a city utility, then they need to also provide the curb and gutter, standard streets, the storm drainage and that.

And that's how that law or that ordinance came about so that it would not circumvent the other requirements of the city when you're providing city services.

MS. PARSONS: Didn't that -- wasn't there an ordinance that was changed within the past year that they do not require the curb and gutter outside the UGB?

MR. KIRCHNER: I don't know.

MS. PARSONS: I believe there was.

MR. KIRCHNER: That would be the county planning commission outside the UGB.

MS. PARSONS: No, this was the city council that passed an ordinance that they do not require the curb and gutter outside the UGB, nor do they require them to, you know, be inspected because they couldn't. I mean, how can someone in the county go to the city for an inspection?

MR. KIRCHNER: The way the ordinance reads that I have is that they're required to build the subdivision by our standards.

MS. PARSONS: Yes, inside the UGB. But then there was an ordinance that was, I believe, changed.

MR. MOSER: Susan, do you know anything --

MS. McGANNON: I don't know what they're referring to, no. There is a general ordinance.

MS. PARSONS: Okay. Well, I can bring you a copy of it.

MS. McGANNON: I'd appreciate that.

MS. PARSONS: Okay. Thank you.

MR. MOSER: Thank you. Anyone else?

MRS. DIAMOND: Lenore Diamond from Christiana.

I really have a question, I guess it's for Mr. Kirchner. I am totally confused, and maybe you can explain it to me.

In Thursday, March 7th, paper -- your picture is on it -- the second paragraph says, (as read) But the city has no immediate plans to extend its sewer past its urban growth boundary to the Christiana area for the next 15 to 20 years, and the board will own and maintain the force main sewer line to serve only Christiana schools, explained Joe Kirchner, etc.

And I don't quite understand that. And then a few minutes ago -- I'm not sure whether you said it or not -- you said the only reason that the Buchanan sewer assessment was in was there was a catalyst to go out there. And I also want to ask, what was that catalyst?

MR. KIRCHNER: The answer to the first question is, what I said there is that in our wastewater facilities plan, there's the Barfield-Salem interceptor that's proposed in the long-range plan which would go to the Christiana to serve. That is 15 years or greater out.

So our plan as it's been drafted did not have sewers going out to the Christiana school except 15 years beyond.

What the county school board proposed was they had an immediate need and wanted to put the pump station in and the force main to get it back into the Murfreesboro system.

Does that answer your question?

MRS. DIAMOND: No. I understand that because you explained that before.

What about the catalyst, then? What was the catalyst? Farrer Brothers requesting a sewer line to their property?

MR. KIRCHNER: We were just speaking about the Christiana school.

MRS. DIAMOND: Yeah, but it's all tied in because the Christiana school or the Buchanan school or the people out there, nobody was to get that sewer. It was going directly at the developer's request and deal with the city.

So I'm assuming, and you can correct me, if that catalyst -- is that what you were talking about the catalyst? And now it confused me and a lot of people have called and said, Well, what is this? You know, Mr. Kirchner said that they're not going to go beyond their urban growth boundary to Christiana, but yet you've already voted to go to the Farrer property so he can build 2100 homes. I'm totally confused.

MR. KIRCHNER: Okay. What we have discussed and what we are concerned about is because of the concern in the Buchanan area. When we were approached about the Christiana school, we said this is outside the urban growth boundary. We want to bring in the county planning commission and Nancy Allen into this to make sure that they all agree with this concept.

That's when we were criticized before, is that we didn't bring in the county into the issues. And so what we did was say, Okay, but we want the county to be involved with these discussions as far as getting sewer to the Christiana school.

MRS. DIAMOND: Yeah. Well, I think that's really important to get it to the Christiana and Buchanan school.

But what about the Farrer property? Is it still going out there, too?

MR. KIRCHNER: Yes.

MRS. DIAMOND: It's still going to go out there? Well, the community and nobody had any say in that. We had no representation in the city, and the city can come and do anything they want to the people out there and to that community without any input from the people.

But now all of a sudden, you were able -- you had to do that for the developer. But when it came to the school, now you can change the playing field a little bit. We don't have an equal playing field out there.

MR. KIRCHNER: Are you saying you would rather have the gravity sewer?

MRS. DIAMOND: I'm saying, we don't want a sewer out there because of the violation of the urban growth boundary and that it will cause high density housing. Farrer Brothers will then -- or any developer. I don't mean to single him out.

MR. MOSER: You live at Buchanan; is that correct?

MRS. DIAMOND: Yes, I do.

MR. MOSER: Not Christiana?

MRS. DIAMOND: Christiana is a whole huge area, and it is called -- I live in Christiana. My address is 6960 Millersburg Road, Christiana, Tennessee, 37037; and I've lived there for 19 years in Christiana.

So, you know, you can call it Buchanan. I'm Christiana, and the people who live down on 231 are also Christiana, and the ones who live near Hoover Gap are also Christiana.

MR. KIRCHNER: I want to make it clear that the state law as I've been told and have been advised is it doesn't preclude sanitary sewer service outside the urban growth boundary into the rural area. It doesn't preclude that.

The land use issues would be the Rutherford County planning commission issues as far as densities and things like that.

You know, we could put sewer out there and they could put, you know, large lots. I mean, it's just whatever would be the wishes of that planning commission.

MRS. DIAMOND: Okay. I see we're going around in circles. So I thank you for your time.

MR. MOSER: Thank you. Anyone else?

MR. MARTIN: My name is Paul Martin, and I own 116 acres right there at the exit of Buchanan Road, Epps Mill Road, and onto the interstate.

We bought a little farm there. Well, it's 116 acres. We had a little house. My wife remodeled that little house, and we spent quite a bit of money.

And then we got some wet weather. You could flush the commode once. That's all. The next time you flushed it, it would back back up.

So we couldn't stay there. I bought a house in Manchester. We come to the farm and visit the farm. And I drove down there during this last rain that we had.

I would say 60 to 80 percent of the homes in that area had water all around them. And these people don't think that that sewer from their lines is not going to come up and get in the streams? I've got news for them.

Y'all come on with the sewer. We need it. We need it real bad. If you do this, you know, you'll be within the Buchanan school. It won't be far to come over from the Buchanan school and tap into that line.

And most of the people that's against this live miles away from it.

Did you ever check your speedometer from Buchanan Road to where you live on Millersburg Road?

MRS. DIAMOND: Yes, I have.

MR. MARTIN: How far is it?

MRS. DIAMOND: Four miles.

MR. MARTIN: Four miles. Thank you.

With no further questions or comments from the audience the Public Hearing was closed.

---END OF HEARING---

CERTIFICATE OF COURT REPORTER

I, Marilyn Gorski, Court Reporter and Notary Public within and for the State of Tennessee, at large, do hereby certify that the foregoing pages, including this page, are a true and correct transcript of the video tape of the Murfreesboro Water and Sewer Board meeting held on March 13, 2002, to the best of my ability, not having been personally present to record same.

I further certify that I am not an attorney or counsel of any of the parties, nor a relative or employee of any attorney or counsel connected with the action, nor financially interested in the action.

_____, 2002

_____
MARILYN GORSKI, Court Reporter